

# DRAFT

## Environmental Impact Statement Continental Divide-Creston Natural Gas Development Project

### Volume II

November 2012



The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

**BLM/WY/PL-13/002+1310**

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## APPENDIX A: SUMMARY OF SCOPING COMMENTS BY CATEGORY

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### Introduction

As described in **Section 1.6, Public Participation**, the BLM conducted public scoping for both the Creston/Blue Gap II and the Continental Divide-Creston Natural Gas Development projects. In the fall of 2005, BLM published a Notice of Intent in the *Federal Register* and invited the public to comment on a proposal for more extensive development in the Creston/Blue Gap II natural gas field. A public meeting was held in Rawlins on October 13, 2005. During the scoping period on the Creston/Blue Gap II Project, the BLM received 29 individual comment letters, faxes, and e-mails.

Very soon after the Creston/Blue Gap scoping process had been completed, BLM RFO received a proposal from BP America Production Company (BP), representing themselves and other leaseholders, to further develop lease holdings in the Continental Divide/Wamsutter II natural gas area. The BLM decided to combine this project with the Creston/Blue Gap project into a single EIS and initiated another scoping process for the newly named Continental Divide-Creston EIS. The BLM published a Notice of Intent for this larger Continental Divide-Creston project on March 3, 2006. A public meeting to discuss the project was held in Rawlins on April 6. In addition to the 29 comments received during the original scoping period, 21 comment letters, faxes, and e-mails were received for the combined Continental Divide-Creston Project. Most of the respondents were the same for both projects.

**Section 1.6.2, Key Issues and Concerns**, describes those issues raised during the course of scoping for both phases of the project that are considered central to the analysis of impacts in this EIS- those issues that have not already been addressed as matters of law or policy, that deal with resources of high value in the project area, and that would be directly affected by the BLM's decision on natural-gas development in the project area. This Appendix includes a more comprehensive listing of the issues that were raised during the process. The Continental Divide-Creston Public Scoping Notice included a list of scoping questions representing preliminary issues identified by the BLM with regard to resources and management issues. These issues, shown below as *BLM Scoping Questions*, include air quality, cultural resources, land use, soils and vegetation, hydrology and water rights, wildlife, visual resources, noise, recreation, transportation, socioeconomic resources, and reclamation.

BLM's scoping questions and a summary of the public comments received are described below, categorized by resource and management issue. In some instances, BLM did not identify scoping questions for a particular issue; thus only comments are listed.

### ■ PHYSICAL RESOURCES

#### Soils

##### *BLM Scoping Questions:*

- Are there short-term, direct impacts to the soils in the project area?
- Are there long-range, indirect impacts to the soils resources in the project area?
- How much surface area will be disturbed and for how long?
- What provisions for interim reclamation will be made?
- What measures will be taken to minimize erosion and sedimentation once soil and vegetation is removed from disturbed sites?

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### *Scoping Comments:*

- Consider effects of erosion from wind, and to a lesser degree, water
- Consider mitigation measures that can reduce removal of topsoil and vegetation, and other practices that may have significant short-term impacts to soils.
- BLM must protect against soil erosion by identifying and protecting fragile, steep, or highly erosive soils, including biological soil crusts.

### **Water Resources**

#### *BLM Scoping Questions:*

- What are the watershed characteristics of the project area?
- What existing conditions of stream banks and streambeds might be affected by the proposal?
- What is the direction and magnitude of groundwater flows in the project area?
- What are the recharge and discharge characteristics of groundwater in the area, including the relationship between ground and surface waters?
- What are the existing qualities of surface and ground water in the project area? How will the project affect surface and ground water qualities?
- How will produced water from coalbed de-watering operations be utilized and/or disposed of?
- What measures will be taken to minimize erosion and sedimentation once soil and vegetation is removed from disturbed sites?

### *Scoping Comments:*

- Consider effects to water quality in the Colorado River.
- Consider degraded groundwater and surface water.
- Draining all the water from the ground lowers the ground level, provides no water for plants.
- Disclose whether any stream segments exceed water quality standards and/or are listed in the state's Clean Water Act. Determine if any planning and evaluation has been conducted on streams that have been evaluated as impaired, or if there is doubt as to whether any streams are achieving State water-quality standards.
- BLM must insure that waters in the project area comply with state water quality standards and with sections 401 and 404 of the CWA.
- Maintain a buffer zone and NSO around natural springs to protect water quality. Carefully evaluate the appropriate width of buffers and discourage all development or alteration of natural springs.
- BLM must comply with its obligations under the ESA concerning salt and sediment loads to and depletions from Colorado River watersheds.
- Selenium content of produced water must be 2 µ/L to protect fish, waterfowl, shorebirds, and other wildlife. Due to "bioaccumulation" in living tissue, the amount of selenium discharged (not the concentration released) must be monitored and regulated.
  - Do not discharge produced water with selenium concentrations > 2µ/L into closed containment pits or ponds for disposal by evaporation.

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- Estimate selenium and other trace element concentrations in evaporation ponds using an appropriate model, over a period of years to determine if selenium and other trace elements could post a risk to migratory birds using the pond.
- To prevent migratory bird mortality for species using evaporative ponds:
  - Using an appropriate model, estimate the sodium concentrations in produced water within the evaporation pond over a period of years to determine if sodium could pose a risk to migratory birds landing on the pond. If the model shows that sodium concentrations would exceed 17,000 mg/l, then the pond should be designed with effective wildlife exclusionary devices to prevent access by migratory birds, or other options should be considered for containment and disposal of produced water.
  - If the predictive model does not show an increasing trend in sodium concentrations, the pond should be monitored annually to verify whether levels are increasing over time. If concentrations exceed 17,000 mg/L, netting or other effective wildlife exclusionary devices should be deployed to prevent access, or other options considered for containment and disposal of produced water.
- No surface disposal of produced water should be allowed due to increased salt loading within the Colorado River basin. In addition, it would alter the chemistry, suspended solids, water temperature and/or natural hydrograph of the watershed in the Muddy Creek drainage, which could result in elimination of native fish populations even if the water meets TDS loading set by the Colorado River Basin Salinity Control Forum in 2002.
- Evaluate the use of produced water to irrigate croplands in terms of potential land use changes.
- Analyze management of produced water through re-injection into underground reservoirs through National Pollution Discharge Elimination permits.
- Inject produced water from coalbed methane underground; no surface disposal.
- How are the formations identified for re-injection related to the formations that produce the springs that create the stream in the Muddy Creek drainage?
- Hydrostatic test water released during pipeline construction could alter stream channels, increase sediment loads, and introduce potentially toxic chemicals or invasive species. Avoid discharging hydrostatic test waters directly to streams; release them first into a temporary sediment retention basin if suspended solids concentration is significantly higher than receiving water. Use potable or freshwater well sources for hydrostatic test water.
- At no time should water from a surface source in one basin be discharged into another basin, which could spread nuisance species.
- Regarding pipeline construction and operations:
  - Pipeline crossings of perennial streams should be bored underneath the stream rather than trenching through it, especially Muddy Creek and its primary tributaries.
  - Install pipeline crossings through ephemeral streams by trenching, using riprap to stabilize stream banks. Place riprap from the channel bottom to the top of the high water line on the bank. Use double-ditching techniques to separate the top one-foot of stream-bottom substrate from deeper soil layers, and reconstruct by replacing deeper substrate first.
  - Locate pipelines that parallel drainages outside the 100-year floodplain. Construct pipeline crossings at right angles to all riparian corridors and stream to minimize the area of disturbance.
  - Use the minimum practical width for rights-of-way where pipelines cross riparian areas and streams.

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- Any new road crossing of Muddy Creek proper is opposed; a bridge should be used to span the channel and riparian zone, and the structure should not impact or restrict flow in the channel on the 50-year flood plain.
- For perennial tributaries in the Muddy Creek drainage, design road crossings to allow fish passage at all flows. Preferred structures in descending order: bridge spans with abutments on banks, bridge spans with center support, open-bottom box culverts, and round culverts with the bottom placed no less than one foot below existing stream grade. Perched culverts block fish passage and are unacceptable in any stream that supports a fishery.
- Drilling should not be permitted on slopes exceeding 25%.
- Design drill pad sites to drain storm water and other fluids into a reserve pit with capacity to intercept and hold excess precipitation. Line all reserve pits, irrespective of soil types, with an impermeable barrier to eliminate leaching.
- Staging, refueling, and storage areas should be located away from riparian zones and flood plains. Keep all chemicals, solvents, and fuels at least 500 feet from streams and riparian areas.
- Locate and construct all structures crossing intermittent and perennial streams so they do not decrease channel stability or increase water velocity.
- BLM must protect against degradation of water quality by implementing measures such as lining of reserve pits or pitless drilling.

### **Climate and Air Quality**

#### ***BLM Scoping Questions:***

- What emission sources and values will be generated by the project?
- How will air quality impacts be evaluated and resources protected during development and operations?

#### ***Scoping Comments:***

- General concern: long-range protection of visibility.
- The EIS should be consistent with the Rawlins Draft RMP/EIS, which proposed to use a comparative, emissions-based approach.
- BLM must assure full compliance with the Clean Air Act.
- Fully explain and interpret projected impacts, summarizing modeled results and the various methods and assumptions used so that the public can easily understand them for their significance. Include specific mitigation measures, such as improved diesel engine technology and fugitive dust control.
- Estimate potential future changes in emissions. Modeling should address cumulative emissions in the Rawlins Field Office planning area that affect the same areas as C/BGII. Include information in the DEIS regarding cumulative impacts from coal production in the vicinity.
- Address reasonably foreseeable gas and other development in the area, and possible changes in this and other proposed projects. For example, the Jonah Infill gas project suggests that improved diesel engine technology may be necessary for all future gas development projects in Southwestern Wyoming to protect Class I and other air resources.
- Disclose the effects of increases in  $\text{No}_x$  and other pollutant concentrations, including regional haze, and clarify control measures.



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- The fugitive dust analysis should emphasize the  $\text{Pm}_{10}$  standard and percentages of emissions that are fine and coarse particles. Address near-field impacts of fugitive dust, and whether there is potential to approach NAAQS standards.
- Describe potential air impacts of venting and flaring, and whether BLM or the State of Wyoming are considering flare less flow back or similar technology as mitigation.
- Address proposed and needed air monitoring. If BLM intends to add air monitoring stations, describe the program in sufficient detail to ascertain locations and objectives of the monitoring effort.
- The EIS must analyze the cumulative effect on air quality, including all sensitive receptors potentially affected, and acknowledging all reasonably foreseeable emission sources. Additionally, BLM must ensure compliance with all air pollution standards and discuss all mitigation measures available to prevent air quality violations, increment exceedances and adverse impacts to AQRV, including visibility impairment in Class I areas.
- We request that BLM reject use of the Scheffe model for estimation of ozone pollution and use instead an up-to-date photochemical model such as CAMx or CAMQ.

### ■ BIOLOGICAL RESOURCES

#### Vegetation and Riparian/Wetland Communities

##### *BLM Scoping Questions:*

- Are there short-term, direct impacts to the vegetation resources in the project area?
- Are there long-range, indirect impacts to the vegetation resources in the project area?
- How much surface area will be disturbed; for how long?
- What provisions for interim reclamation will be made?
- How will noxious weed populations be monitored/ controlled?
- What are the revegetation standards and requirements?
- Are there adequate reclamation bonds or other guarantees for reclamation of site disturbance?
- Will there be impacts to jurisdictional wetlands or Waters of the U.S.?
- How much surface area will be disturbed and for how long?
- What provisions for interim reclamation will be made?
- What measures will be taken to minimize erosion and sedimentation once soil and vegetation is removed from disturbed sites?

##### *Scoping Comments:*

- BLM should conduct surveys to determine the location and characteristics of native plant communities and rare or special status species and insure compliance with EO 13112 relative to invasive species.
- Outline minimum reclamation standards that emphasize use of native plant species, post-reclamation monitoring, and management.

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- Riparian and wetland habitat buffer zones should preclude new surface-disturbing activities within the 100-year floodplain or within a designated buffer. Recommend buffer zones that include NSO stipulations and clarify if surface occupancy exemption may be granted, including the nature of its mitigation. Clarify if exemptions may be restricted based on the cumulative effects of similar actions in any one riparian area.
- Take measures to avoid wetland losses in accordance with Section 404 of the Clean Water Act.
- Inventory and fully describe wetlands that may be destroyed or degraded in terms of functions and values, and outline specific actions to minimize impacts and compensate for unavoidable impacts.
- Avoid impacts to riparian areas; minimize and assess functions and values in areas of unavoidable impacts, and develop and implement measures to compensate unavoidable losses.

### **Invasive, Non-native species**

#### ***BLM Scoping Questions:***

- How much surface area will be disturbed and for how long?
- What provisions for interim reclamation will be made?
- How will noxious weed populations be monitored, and controlled?

#### ***Scoping Comments:***

- Describe the current trend for weed infestations. Include the location of weed infestations within and surrounding the project area, the trend in infestations, specific measures for oil and gas leases, and the annual budget available to affected counties and BLM for invasive species control.
- BLM must provide measures to impede the invasion of noxious weeds.

### **Terrestrial and Aquatic Wildlife**

#### ***BLM Scoping Questions:***

- What are the current conditions and extents of wildlife habitat in the project area?
- What are the seasonal patterns of wildlife use and movement in the project area?
- Are wildlife populations increasing or decreasing in the project area?

#### ***Scoping Comments:***

- With regard to wildlife habitat fragmentation, analyze the project at a level that reflects full potential development of the area, rather than on a piecemeal basis to ensure that the consequences of full-field development are clearly understood before wildlife resources are committed.
- Address loss of wildlife habitat and habitat effectiveness, fragmentation, effects to migration corridors, harassment of wildlife by increased traffic, noise, and illegal activities.
- Evaluate where elk will be displaced to, and whether such habitat is suitable and/or herds will be tolerated by private landowners.
- Conduct raptor nest surveys and evaluate impacts to nesting. Establish mitigation such as seasonal timing restrictions, siting of facilities, and installation of artificial nesting platforms away from project disturbances and areas where they could impact Sage-grouse.

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- Evaluate expected cumulative impacts to wildlife habitat and individual populations and herds relative to other energy development occurring in the area, particularly Atlantic Rim.
- Analyze impacts to each of three separate pronghorn herds, both direct and cumulative (instead of a regional or species analysis). Analyze impacts to individual herds of mule deer and elk, as well as three Sage-grouse management areas that overlay the project area.
- Evaluate impacts to mountain plovers.
- Use the lowest road densities possible to minimize habitat loss and disturbance by vehicles.
- Operators should fund necessary wildlife surveys exceeding those normally conducted annually by state and federal biologists.
- The EIS must address the impacts of oil and gas development on wildlife and wildlife habitat function, including:
  - the ecological needs of wildlife on a regional scale;
  - impacts on pocket gophers;
  - impacts on mountain plovers;
  - impacts on prairie dogs.
  - the dispersal or recovery of gray wolves in the southern Red Desert;
- BLM must ensure full compliance with BLM Manual MS-6840.06.E (Special Status Species Management), including attention to ferruginous hawks, other raptors and sage-grouse.
- We urge that BLM protect more than “critical” big game winter ranges.
- We ask that the environmental analysis provide for wildlife diversity by protecting riparian areas and other special habitats, protecting certain species, maintaining connectivity between habitats, maintaining corridors, and assessing indirect and cumulative impacts.
- BLM should adopt the provisions of the WGFD recommendations on sustaining important wildlife habitats affected by oil and gas development.
- The EIS should analyze potential impacts to wildlife habitat, including big-game crucial winter range, sage-grouse, raptors, predators, and big game in general.
- Consider the impact of road building, increased human presence and disturbance, timber harvest, mineral exploration, grazing, etc. on wildlife.
- Protect all species of migratory birds, including Bald eagle.
- The project will be detrimental to the ability to sustain area wildlife.
- Natural gas development is estimated to span 30-50 years in Desolation Flats and Continental Divide/Wamsutter II, and this project will last as long if not longer. Where will wildlife go?
- The northern portion of the project area supports the only viable assemblage of native bluehead suckers, roundtail chubs, and flannelmouth suckers known to still exist in Wyoming. This portion of the stream provides preferred breeding habitat, and movement up or downstream is restricted by the combination of physical barriers and water temperatures. Any cumulative energy development activity that negatively affects the integrity of the watershed and overall stream health may jeopardize their future existence. An NSO restriction is recommended for surface gas development between the Continental Divide north of Muddy Creek proper and the Muddy Creek/Dry Cow Creek hydrographic divide located south of Muddy Creek and upstream of the large wetland complex.

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### Special Status Species

#### *BLM Scoping Questions:*

- How much surface area will be disturbed and for how long?
- What provisions for interim reclamation will be made?
- Which wildlife species of importance may be impacted by the proposal?
- Will any threatened or endangered species be affected by the proposal?

#### *Scoping Comments:*

- The EIS must address the impacts on BLM sensitive plants.
- Assemble regional habitat-use data from published data where available for T&E species and other key species. Include impacts of road density on local species, distance of road effects to determine the width of effect zones, and species dispersal distances to evaluate the size of core areas.
- The following T&E Species, or species proposed for listing, may be present in the project area:

**Bald eagle** (threatened; found throughout the state). Restrict activities within 1 mile of nests in open country year round. Limited disturbance home range buffer zone may extend outward in potential foraging habitat for 2.5 miles from the nest.

**Black-footed ferret** (endangered; prairie dog towns). There may be impacts to two white-tailed prairie dog complexes in the project area where the species is found, and surveys may be recommended if complexes of greater than 200 acres are affected.

**Blowout penstemon** (endangered; sand dunes south of Ferris Mtns). Surveys should be conducted in mid-June to early July when flowering occurs.

**Ute ladies'-tresses** (threatened; seasonally moist soils & wet meadows below 7,000 feet). Surveys should be conducted.

**Colorado river fish: Bonytail, Colorado pikeminnow, Humpback chub, and Razorback sucker** (endangered; downstream riverine habitat, Yampa, Green and Colorado). Formal consultation is required for projects that may lead to depletion of the waters including ponds, lakes, reservoirs, hydrostatic testing of pipelines, wells, dust abatement, diversion structure, and water treatment facilities.

Include an estimate of the amount and timing of average annual water depletion, both existing and new; describe estimating methods, location of depletion, if and when water will be returned to the system, and what the depletion is being used for.

**Yellow-billed cuckoo** (candidate). Provide status of the species in and near the project area.

**Sensitive species**, as identified on the Wyoming Natural Diversity Database.

**Pygmy Rabbit**. Encourage project planning measures that retain large tracts of suitable habitat and corridors to adjacent habitat.

**Greater Sage-grouse** (species of concern).

- Closely evaluate any activities that result in loss or degradation of sagebrush habitat.
- Contact Wyoming Game & Fish to identify important habitats, and survey/map important habitats where local information is not available.
- Evaluate long-term and cumulative effects on the species, since reclamation may not restore populations to pre-activity levels.

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- Unless site-specific information is available, manage habitat following Western Association of Fish and Wildlife Agencies guidelines.

***Mountain plover*** (species of concern). Develop protective measures with an assurance of implementation should they be found in the project area.

- Consider whether potential impacts to listed species on state and private lands will occur as a result of actions on BLM managed lands, and develop measures to avoid or minimize impacts.
- The EIS must address the impacts of oil and gas development on wildlife and wildlife habitat function, including:
  - implementation of a conservation community “blueprint” for Sage-grouse and Sage-grouse habitat throughout the project area;
  - impacts on mountain plovers;
- BLM must analyze how ESA and BLM-sensitive species would be affected by failure to conserve white-tailed prairie dogs, including the impact on black-footed ferret recovery and on BLM-Sensitive and Colorado River Endangered fish species.
- Native fish species in the Muddy Creek drainage are considered sensitive (Status I Species) to both State and Federal agencies. Therefore, habitat function is to be maintained. WGFD’s Strategic Habitat Plan identifies the Muddy Creek watershed as the #2 habitat priority for both aquatic and terrestrial wildlife in most of Southwestern Wyoming.
- BLM must analyze how other ESA and BLM-sensitive species would be affected by the project, including BLM-Sensitive and Colorado River Endangered fish species.
- Baseline studies on pygmy rabbits and impact on this species should be included in the EIS.
- Full-field development will destroy habitat value for sage-grouse leks, hastening their listing under the Endangered Species Act.
- In addition to direct habitat loss for greater Sage-grouse, evaluate secondary disturbance to Sage-grouse in undisturbed habitats adjacent to the project area.
- Evaluate expected impacts and habitat avoidance by Sage-grouse due to structures (particularly powerlines)
- Consider development of artificial leks near existing roadside leks to attract grouse to safer areas.
- Identify and map all existing disturbances of Sage-grouse habitat near the project and evaluate the degree of existing habitat fragmentation, as well as how it would be accelerated by this proposal.

### **Wild Horses & Burros**

A cumulative impact analysis is recommended examining regional effects to the area including South Baggs, Atlantic Rim, Desolation Flats, Pacific Rim, Table Rock, and Vermillion Creek natural gas fields, and the Black Butte Mine. Include the overpopulation of feral horses and nonstandard fences in the analysis of effects on wildlife.

## ■ HUMAN ENVIRONMENT

### Visual Resources

#### *BLM Scoping Questions:*

- Will there be visual impacts from the project?
- Can visual impacts be mitigated to conform with the existing landscape and visual quality objectives

#### *Scoping Comments:*

- The project will destroy natural vistas and open spaces. BLM should avoid development in areas where the impacts of development would be visible for long periods of time or from long distances
- BLM must protect visual character and scenic resources, including protection from light pollution and impacts to the appearance of the night sky..
- A sensitive landscape that warrants special protection for its visual quality is a “a small portion of the Red Lake Dunes Citizens’ Proposed Wilderness” located in the dune field immediately west of the gravel road leading northward to Hay Reservoir.
- Identify and set aside important scenic and undeveloped areas so that the public has a few unimpaired lands left to visit after this project is underway.
- The North Flattop unit is an area of high importance for visual resources that is not protected under the Great Divide RA RMP, that should be excluded from O&G development. Other such areas are Red Lake Dunes and Cyclone Rim (Class I).
- Protect visual quality in a “5-mile buffer” associated with the Continental Divide Trail (Class I) and with the Cherokee and Overland trails (Class II).
- The EIS should analyze the impacts to scenic quality from effects to visibility and of impacts to the landscape from drilling.

### Recreation

#### *BLM Scoping Questions:*

- How would the proposal affect recreation in the immediate and general areas?
- Are there opportunities to enhance recreational opportunities in and around the project area as a result of the proposal?

#### *Scoping Comments:*

- Evaluate whether increased well densities and roads will further impact recreational use (including hunting). If there is any potential for closing public lands near gas company facilities, address it in the EIS.
- Fragmented/shrinking habitat due to road development could increase grazing competition with wild herds and also decrease hunting success and/or hunter numbers.
- Opposition was expressed to the implied notion of having industry enhance recreational opportunities.

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- BLM should explicitly address “unquantified environmental values” such as the value of the project area and nearby lands for primitive and unconfined recreation and for “simple open space values.”
- Map of recreational resources identifies two areas of “Citizens’ Proposed Wilderness” that potentially affect the project area. These are associated with the Red Lake Dunes WSA and the Adobe Town WSA.

### Cultural and Historical Resources

#### *BLM Scoping Questions:*

- Will there be impacts on historic and archaeological resources in the project area as a result of development and operations?
- Are there any cultural resources located in the project area that would be eligible for the National Register of Historic Places?

#### *Scoping Comments:*

- Conduct thorough archaeological studies and provide mitigation to protect paleontological, historic, prehistoric, or cultural resources in the project area.
- Give specific attention to historic trails in the area.
- Give great consideration to the effects of further authorized development on visitors to historic trail corridors.
- Work with recognized experts to prevent damage to historic trail ruts, considering the economic costs of damage.
- Ensure that there is sufficient inventory of cultural resources in order to avoid resource conflicts.
- BLM must pursue consultation with Native American tribes and protect native sites, and must meet its Section 110 and Section 106 obligations and the requirements that it consult with appropriate Native American groups.

### Socioeconomics

#### *BLM Scoping Questions:*

- How would populations of Sweetwater and Carbon Counties be affected by the project?
- How much income to Carbon and Sweetwater Counties and the region would be generated by the project?
- How will the project affect the tax base of local government?
- Will there be any impact to local social services, law enforcement, schools or other local community services as a result of the project?
- Will there be an impact on housing costs in Rawlins, Wamsutter, and other Carbon and Sweetwater County communities as a result of the project?
- What will be the impact of the project on the economies of Rawlins, Wamsutter and other Sweetwater and Carbon County communities?

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### *Scoping Comments:*

- BLM must estimate the amount of gas that is both technically and economically recoverable.
- Economically recoverable reserve estimates must include the costs of exploration, development, production, profit, transportation costs, non-market costs, off-site mitigation costs such as increased water treatment costs.
- Please complete a marginal revenue cost analysis of estimated gas production levels. Please compare and contrast the marginal revenues with the marginal costs for the full range of drilling levels.
- Socioeconomic impacts to surrounding communities should be assessed including labor competition, housing demand and government expenditures.
- Request that BLM's socioeconomic assessment should follow the approaches set out in the scoping briefs "*Socioeconomic Framework for Public Land Management Planning: Indicators for the West's Economy*" and "*The Economic and Social Impacts of Oil and Gas Development*."
- BLM should utilize a Total Economic Valuation Framework for evaluating proposed oils and gas development projects.
- The scope of the BLM analysis should extend beyond the surrounding areas.
- BLM must recognize wilderness characteristics and other natural qualities as valuable resources that provide multiple uses for the public.
- Request that BLM fully consider the indirect role of wild lands in attracting non-recreational businesses and retirees.
- A full accounting of all hidden costs of oil and gas drilling is needed. Hidden costs include:
  - changes in direct use of lands within and adjacent to the analysis area,
  - changes in community conditions such as air water and noise pollution,
  - reductions in the value of the area for study of natural ecosystems,
  - off-site environmental effects on other uses of the land,
  - effects on biodiversity, effects on ecosystem services, effects on passive use.
- The BLM should avoid IMPLAN or other input-output models that are grounded in economic base theory when estimating jobs and income for each alternative. We recommend that BLM use the EPS model developed by and available free from the Sonoran Institute.
- The NEPA analysis should be based on reasonable (BLM) budget expectations, which should be clearly stated and the BLM must include a fiscal analysis of alternative implementation and mitigation costs.
- To provide socioeconomic context, the BLM should examine historic trends in county income and employment, using the Sonoran Institute Economic Profile System.
- Request that the agency identify all applicable federal state and local tax laws including exceptions and reductions and make realistic and accurate estimates of net tax revenues from oil and gas production, based on economically recoverable reserves and including the net environmental and community costs from drilling and production.
- Estimate the socioeconomic costs to communities from oil and gas development.
- Increased costs to private landowners and residents.
- Increased costs to local governments.



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- Economic instability and loss of economic diversity.
- Estimate and evaluate the environmental costs of oil and gas development.
- Bonding requirements for industry must be estimated and included in the analysis.
- BLM must include an analysis of the costs of implementing each alternative, including the cost of mitigation measures. These costs must then be contrasted with the anticipated budget levels to assess the probability of mitigation measures being fully implemented. BLM should include a reasonable budget limitation and evaluate a set of management alternatives that are constrained by that budget level.
- The costs of enforcement of environmental protection and mitigation requirements must be estimated and included in the NEPA analysis.
- The project specific and cumulative effects of increased costs and decreased revenues on affected grazing operators should be assessed.
- Recommend that the EIS include a full and thorough social and economic impact analysis including impacts to livestock grazing.
- The EIS should include an assessment of the potential for loss of environmental, historic and social values associated with livestock grazing and the importance of such losses to area residents and visitors.
- BLM must address state and federal as well as local benefits associated with royalty payments and tax revenues derived from natural gas production associated with the CD-C project.
- The benefits of increased supplies of natural gas to the consumer must be analyzed and discussed.
- The EIS should contain a detailed analysis of the socioeconomic impacts and positive effects of the proposed action and alternatives for the State of Wyoming and affected counties and communities.
- The local economy significance criteria should be discussed.
- The EIS should consider potential project effects on local communities including housing, schools, water and wastewater services, increased road traffic with associated dust and hazardous materials spill potential and easier human access to wildlife habitat with associated increased potential for wildlife disturbance. Methods to avoid or mitigate identified impacts should be discussed.
- The assessment should consider the effects of reasonably foreseeable development on area communities.

### Transportation

#### *BLM Scoping Questions:*

- Will motor vehicle traffic be associated with the proposed operation?
- How will employees, contractors, supplies reach the site?
- Will new roads need to be constructed?
- How will infill development affect existing transportation systems including highways, county roads and project area transportation?
- Can transportation planning reduce and mitigate some of the impacts from further development?

## APPENDIX A—SUMMARY OF SCOPING COMMENTS

### *Scoping Comments:*

- Evaluate likely increases in subdivisions, sale of small private tracts, permanent roads, powerlines and fences resulting from this project, and the major negative impacts to all wildlife species in the project area.
- Generate infrastructure scenarios prior to field development, providing multiple road scenarios for potential infrastructure. Include both generous and conservative estimates of infrastructure construction, based on estimates of hydrocarbon resources for the field. Take particular care if unconventional or continuous-type deposits are involved.
- Reduce road density to create blocks of core habitat at a minimum distance from roads (.25 miles for bighorn sheep, pronghorn, and mule deer). Use the Society's landscape fragmentation metrics to guide management decisions regarding transportation routes for other wildlife species, with the goals of reducing road density and edge effects and increasing core areas to provide greater habitat security.
- Establish priorities and best management practices to close and reclaim roads and other routes.
- Create a responsible transportation plan, incorporating detailed guidance from NEPA and FLPMA, specifically:
  - Consider the environmental consequences of the proposed action based on accurate scientific information of high quality [40 CFR 1500.1(b)], and conduct a high-quality analysis of the information collected.
  - Take any action necessary to prevent unnecessary or undue degradation of the lands and minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved. (FLPMA).
  - Following selection of an alternative, continue to monitor the plan, and make appropriate revisions to ensure it is meeting its objectives.
- Use of existing roads and pipeline corridors should be maximized, and extraordinary steps taken where new pipelines or roads cross the trails.
- Use BMPs to locate roads, pipelines, and wells.
- Include the amount of aggregate needed to support anticipated road development in the analysis. The division is concerned about the availability of aggregate from currently permitted operations and the possible need for new sources.

### **Noise**

#### *BLM Scoping Questions:*

- How much noise will be associated with the proposed project and what are those noise sources?
- Will sound effects be audible for specific distances from certain points.
- How will topography affect audibility distances?

### *Scoping Comments:*

- The environmental analysis should address issues related to noise in terms of remoteness and quietness.

## ■ MANAGEMENT ENVIRONMENT

### Lands and Realty

#### *BLM Scoping Questions:*

- What is the current and planned land use policy for the project area?
- What would be the impact on local land use patterns in the project area?
- How does the “checkerboard” surface ownership created by the Union Pacific Land Grant affect the EIS analysis and possible future gas development?

### Rangeland Management

#### *BLM Scoping Questions:*

- How much surface area will be disturbed and for how long?
- What provisions for interim reclamation will be made?
- How will noxious weed populations be monitored, and controlled?

#### *Scoping Comments:*

- Consider the feasibility of supplemental feeding of livestock on permitted grazing land in areas where road construction will decrease available forage.
- Fragmented/shrinking habitat due to road development could increase grazing competition with wild herds. Consider supplemental feeding of livestock or other mitigation measures if necessary to minimize impacts to rangeland.
- The Federation supports water development projects if the water is of high quality. Produced water could be pumped to stock ponds and reservoirs and new storage reservoirs created.
- Consider impacts to rangeland for wildlife as well as domestic animals.
- The scoping notice did not identify grazing or rangeland management as significant issues, and this is a serious and disrespectful omission.
- Road traffic in the Rawlins FO area has led to livestock deaths and injuries from collisions.
- The introduction and growth of noxious weeds has weakened and killed livestock and crowded out forage.
- The significant increase in road dust has diminished the palatability and nourishment of forage.
- Damaged cattle guards, cut fences, and unlocked gates have raised unnecessarily repair costs and diverted labor to search for lost livestock, some of which were never found.
- Loss of water from artesian and flowing wells has weakened livestock health, reduced weight gain and available forage, induced weeds.
- Reclamation has been poor, resulting in further loss of forage.
- Potential conflicts should be characterized as “probable,” not “possible” as currently written.
- Data from the Fremont County study conducted by the University of Wyoming should be included in the EIS.
- The BLM, grazing permittees, and proponent should work cooperatively throughout the life of the project to make site-specific, case-by-case decisions.

## **APPENDIX A—SUMMARY OF SCOPING COMMENTS**

- Research and monitoring conducted by the operators should include movement of livestock to an open allotment or pasture, purchase of hay in lieu of allotment use, monitoring of development impacts, including use of the Wyoming Rangeland Monitoring Guide of August 2001, construction of water and range improvements on either public or private land, purchase or lease of additional grazing land to replace lands lost to grazing, and reimbursement to producers for loss of AUMs and pastures.
- Analyze the impacts of the loss of open space, scenic vistas and historic rural landscape as related to loss of grazing lands.
- The impact of this project upon food and habitat for domestic animals deserve the same study and documentation as for fish and wildlife.
- Include the positive effects of livestock grazing on the environment and as a tool to achieve environmental objectives, and the impacts of the project on limiting the ability of livestock grazing to achieve positive effects.
- Evaluate how development of additional wells would affect distribution of livestock and feral horses, and effects of changes to grazing on sage-grouse, mountain plover, and big game.
- Address worker housing, the necessity to commute, and the resulting heavy deposition of dust on vegetation and adjacent habitats. Evaluate and mitigate negative effects and loss of AUM's/wildlife forage.

### **Areas of Critical Environmental Concern**

- Give priority to the designation and protection of ACECs for wildlife.
- Designate ACECs in areas of crucial winter range and at pinch points of migration routes, with management prescriptions that include no creation of new routes or expansion of existing routes, no new leasing unless designated NSO, no new energy development, no cross-country travel, limitation of off-road vehicles to designated routes, and closure of unnecessary routes.
- Red Lake Dunes and Chain Lakes proposed ACEC should be withdrawn from drilling

### **Wilderness**

- Wilderness characteristics and other natural qualities must be recognized as a valuable resource.

### **General and Administrative Issues**

- BLM should not approve the project prior to revision of the Rawlins RMP so that the project can be pursued under the framework of an updated RMP.
- The Rawlins Field Office (RFO) is preparing a revision to its RMP that will assess options for preservation of migration corridors and environmentally sensitive areas, including new technologies and other impact-reducing measures. A revised scoping notice for Creston/Blue Gap II removed the requirement that the RMP be complete before a decision is issued for C/BGII; this violates the NEPA process and will delay implementation of RMP decisions, likely allowing more lenient mitigation measures for C/BGII.
- The proponent is bound by stipulations in the Great Divide Resource Management Plan, and in future by the Rawlins Resource Management Plan.

## APPENDIX A—SUMMARY OF SCOPING COMMENTS

- The ROD for this EIS will be held up indefinitely because of delays in preparation of the Rawlins RMP FEIS.
- It is unwise to combine the Creston-Blue Gap and Continental Divide projects because one is an infill project in a largely industrial area and the other includes vast stretches of undeveloped lands.
- This proposal is consistent with the Energy Policy Act of 2005.
- Comment indicated concerns regarding multiple-well EAs/EISs.
- Include PacifiCorp in the process to ensure that their rights to site, construct, operate, and maintain their facilities are considered and protected.
- Work cooperatively with Wyoming Game and Fish, local government, and non-government organizations
- Grant the Alliance for Historic Wyoming “interested party” status for Section 106 procedures for this EIS.
- Hold multiple public hearings.
- Judging from the list of issues, concerns, and opportunities issued by BLM to date, we are destroying what makes Wyoming Wyoming.
- Endless pollution from drilling has cost \$70 million in cleanup costs to taxpayers
- No drilling should be allowed on BLM land unless an insurance policy bond is posted for cleanup costs
- The entire American public is skeptical of our energy policy and secret meetings.
- The rate of development in the eastern Red Desert is completely out of control, following on the heels of Atlantic Rim and soon to be followed by Continental Divide.
- Increased gas supplies from this area, as well as Wamsutter, will be necessary within the next two years to ensure that the Kinder-Morgan/Semptra pipeline to Ohio carries Wyoming gas rather than from other states.
- The writers support the project and development of the EIS.

### Scoping and Approach

- BLM should define the scope of the environmental analysis to include analysis of the cumulative effects of actions/projects that have impacts in common with those resulting from natural gas development.
- BLM should consider, analyze, and wherever appropriate, facilitate, international efforts to prevent environmental decline.
- BLM cannot define the purpose and need for the project as just to allow natural gas to be developed; it must also include strong environmental protections as at least a co-equal purpose and need.
- BLM must establish the baseline condition or all resources in the area in order to evaluate environmental conditions and impacts in an informed manner.
- Require incorporation of all NEPA policies and goals
- BLM should “infuse” the goals and policies of the National Environmental Policy Act into the environmental review and decision document.

## APPENDIX A—SUMMARY OF SCOPING COMMENTS

- Generate landscape metrics for all infrastructure, including density, infrastructure effect zones, and core areas. Metric parameters and evaluation of results should be relevant to ecological conditions, species present, and human use of the landscape. Integrate results into management plans,
- We urge BLM to require that development activities not cause unnecessary or undue degradation.
- Notify all lessees of their responsibility to comply with federal and other applications regardless of land or mineral ownership.
- If BLM, surface owners, and lessees agree, non-BLM lands can be included in section 7 consultation on federal lands.
- Specific management actions like the proposed project must be done pursuant to multiple use and sustained yield principles.
- The environmental analysis and decision document should emphasize resource and ecosystem protection, which will best ensure that future options are retained.
- No new project area disturbance should commence prior to completion of formal consultation under Section 7 of the ESA, preparation of a BA.
- Trade approved APDs for a new APD.
- Provide access to State mineral leases.
- Continue development on fee lands when access across adjoining BLM-administered land has already been approved.
- Permit rights-of-way (pipelines) for previously approved projects.
- Suspend operations on undeveloped federal leases.
- Permit drainage wells for Federal minerals on a case-by-case basis.
- If surface disturbance and other impacts can be shown to be below that analyzed in the EIS, additional wells may be permitted. If reclamation activities can result in reduced surface impacts to a point below that analyzed in the EIS, additional wells may be permitted.
- Set a schedule for completion of the EIS and adhere to it, identifying and explaining the reason for any delays to the National Energy Policy Office.
- Analysis completed for previous projects in this area will provide opportunities to reduce the time and cost required to prepared this EIS. Analysis from other documents should not be duplicated.
- Analyze the impacts associated with the proposed action only.
- Honor the MOU with the Wyoming State Land Office concerning access to state lands and honor private property rights. Make a statement in the EIS addressing BLM's right to restrict access to private lands beyond a customary 30-day right-of-way application period.
- Consult with and use BLM's Reservoir Management Group to assess the requirements to adequately drain natural resources and prevent waste.
- Planned or phased development of the area is not feasible unless one operator controls leases on the entire area because it could create a taking by BLM through restriction of development of a leasehold.
- Consider cumulative impacts of this and other area projects.
- A cumulative impact analysis is recommended examining regional effects to the area including South Baggs, Atlantic Rim, Desolation Flats, Pacific Rim, Table Rock, and Vermillion Creek natural gas fields, and the Black Butte Mine.

## APPENDIX A—SUMMARY OF SCOPING COMMENTS

- A landscape-level analysis should consider direct, indirect, and cumulative impacts of this larger combined project.
- Consider adhering to multiple use under FLPMA.
- Use drilling rigs powered by electricity, natural gas, or biodiesel rather than conventional diesel.
- Overall comments focus on harmonious, coordinated resource management that considers the relative values of resources.
- Any development should be slow and should only occur after reclamation of existing disturbances.
- Development in Wamsutter makes it that much more important to protect remaining pristine landscapes like Adobe Town, Jack Morrow Hills, and Wild Cow Creek.
- No drilling should be allowed the eastern Red Desert
- No coalbed methane development due to as-yet unknown long-term consequences
- All support facilities (roads, power lines, pipelines, and well site facilities) should be included in the APD and Sundry Notice permit process.
- New categorical exclusions can only be legally utilized following an analysis of whether extraordinary circumstances (per NEPA, the ESA, NHPA, etc.) may prevent their application.
- The NEPA analysis should be based on reasonable budget expectations to ensure that mitigation measures and resource protection will be funded, and BLM should include a fiscal analysis of alternative implementation and mitigation costs.
- Given their stewardship responsibilities, governments should encourage or undertake activities that protect the environment and discourage or prohibit those that do not. It is also appropriate for government to own and use land and water resources to protect the environment and to support others in doing the same.
- Government should continually seek to improve the efficiency of its environmental and resource management programs without compromising its responsibilities (a mixture of regulations, incentives, and public ownership of resources). It should aim to bring about as high a level of environmental quality for a given expenditure.

### Alternatives Development

- IM 2005-047 provides guidance for NEPA compliance in oil and gas that supports the Energy Policy Act of 2005 and may not be valid under existing law. Specific concerns include the development of alternatives that increase/accelerate development and use of new categorical exclusions.
- We ask that at least one alternative fully explore phased development and directional drilling to the maximum extent possible.
- Consider an alternative that would only allow minimal surface disturbance.
- We ask BLM to consider an alternative that would only allow development to occur from existing oil and gas well pads, with maximum use being made of directional drilling technologies.
- Similarly, we ask BLM to consider an alternative that would not allow for any additional road construction.
- APDs that have expired will not be extended so that pending APDs may be permitted.

## APPENDIX A—SUMMARY OF SCOPING COMMENTS

- Alternatives must consider geological, technical, and other issues such as correlative and leasehold rights.
- Any constraints in the alternatives should also evaluate the additional difficulties they may generate.

### Directional Drilling

- Directionally drill wells from existing well pads
- Evaluate the effect of intense development and high-density gas wells on the Department's management of Chain Lakes Wildlife Habitat Management Area, including the feasibility of using directional drilling in wetlands and sensitive areas associated with the lakes and use of artificial pads or pontoons to access development sites.
- Directional drilling is appropriate in some areas but should not be mandated for areas where it is not appropriate. Because it increases both cost and risk, directional drilling should be considered only at the site-specific analysis level.
- Use directional drilling and cluster up to 32 wells per pad and avoid intrusion into sensitive wildlife habitats.
- At the very least, directional drilling using 32 wells per pad should be required.
- Require the industry to cluster wells, up to 64 per pad, to minimize surface impacts.
- If directional drilling is to be allowed, why not specify it as the preferred method of extraction? It is a proven, economical technology that minimizes damage.
- If directional drilling is not considered a "reasonable alternative" please be specific as to the meaning of that phrase in the context of the project and its environmental impacts.
- Multiple wells should be drilled at a single location when feasible, and wildlife disturbance minimized (e.g. by automated pumping facilities).
- Include mitigation such as directional drilling and BMPs in all alternatives.
- Require directional drilling and cluster development
- Address the potential for directional drilling to minimize habitat fragmentation;
- Directional drilling should be used to access subsurface gas leases from outside the NSO area.

### Mitigation and Monitoring

- Mitigation plans should include goals and objectives, methodologies, time frames for implementation, success criteria, monitoring, and a contingency plan if unsuccessful.
- Apply a standard NSO stipulation to all riparian zones and a 500-ft corridor from the outermost limit of the riparian habitat.
- During pipeline construction, avoid stripping riparian canopy or stream bank vegetation if possible. Crush or shear streamside woody vegetation rather than completely removing it. Revegetate immediately after stream bank crossings are completed.
- BLM must ensure that the impacts of any coalbed methane development are mitigated.
- Address the exception process for seasonal wildlife stipulations, which are expected to be numerous on a project this size. Note that additional data needed to accommodate industry requests should be funded by industry.



## APPENDIX A—SUMMARY OF SCOPING COMMENTS

- Consider lease and development stipulations to protect critically important wildlife and their habitats.
- Consult with Wyoming Fish and Game and USFWS early in the process to protect critical habitat.
- Discuss and evaluate monitoring data from existing gas development before developing habitat protection strategies and mitigation measures.
- Establish zones of habitat protection of areas of high wildlife value and develop habitat improvement needs in other areas.
- With regard to wildlife habitat fragmentation:
  - Develop a transportation plan to reduce access roads and traffic.
  - Bury power lines within the right-of-way to avoid impacts to raptors and other bird species.
  - Power generators by natural gas to reduce toxic emissions, and fit compressors with high-quality mufflers to keep noise to a minimum
  - Enforce any commitments agreed to by operators during the APD.
- Establish seasonal stipulations on development and production activities in big game habitats, and treatment or modification of remaining habitat or intervening fences to increase the amount or value of crucial winter habitat.
- Address mitigation for short-term and long-term impacts to habitat, and exclusion of waivers for wildlife habitat mitigation.
- Develop and implement route closure and reclamation plans to restore and maintain critical big-game habitat and linkages:
  - **Mule deer:** increase the amount of core area greater than 1,542 feet from route within crucial winter range and along migration corridors.
  - **Pronghorn:** Increase the amount of core area greater than 3,168 feet from a route and reduce route densities below one mile per square mile within crucial winter range and along migration corridors.
  - **Elk:** Reduce route densities below one mile per square mile within crucial winter range and along migration corridors.
  - Prohibit drilling and surface occupancy in big-game wintering areas between November 5 and April 30
  - Implement seasonal traffic restrictions on all roads within 656 feet of Sage-grouse winter habitat (9:00 a.m. to 5:30 p.m., mid-November through March) within 3 miles of breeding and nesting areas (9:00 a.m. to 5:30 p.m., March through mid-May), and in brood-rearing areas (900 a.m. to 5:3 p.m., June through mid-July). Impose a speed limit of 30 miles per hour during non-restricted hours.
  - Combine these species-specific recommendations with more general provisions to benefit all wildlife species in the area such as:
    - planning for staged development of energy resources
    - restricting new roads and energy development, especially within crucial winter range and at pinch points of migration routes
    - allowing few exceptions to temporary occupancy restrictions
    - imposing rigorous standards for ecological restoration of closed routes
    - for all new roads that are built, following the road construction guidelines of the Wyoming Game and Fish Department to minimize the effect of routes on wildlife

## APPENDIX A—SUMMARY OF SCOPING COMMENTS

- including clear enforcement mechanisms to minimize impacts to wildlife
- continuing to research the effects of the transportation network on wildlife species and using this knowledge in adaptive management.
- Develop a clearly defined management plan to protect the grouse population and monitor the success of on-site and off-site mitigation.
- Recommend NSO designation for Sage-grouse breeding habitat between March 1 and June 30 annually and no project-related disturbance from November 15 through March 14.
- Require NSO protections within miles of Sage-grouse breeding leks.
- Consider noise mitigation alternatives such as seasonal timing stipulations, or modifying or enclosing compressors to minimize or eliminate loud, continuous noise during strutting periods from March 1 through May 20 each year. Avoid noise-generating activities from 6 PM to 9 AM within 2 miles of strutting grounds.
- Average noise mitigation levels should be attained no more than 200 meters from the noise source.
- Mitigation should include a 1¼-mile protection buffer and a 2-mile seasonal protection for the duration of the breeding season.
- Identify mitigation to protect nest sites and nesting pairs. Consider construction of artificial nesting poles.
- Include “no fencing” mitigation for roads and facilities that block pronghorn migration. Consider the possibility that pronghorn will trail along plowed access roads during periods of deep snow, and consider plowing escape ramps off roadways.
- Maintenance personnel should visit wells at midday to reduce harassment when seasonal stipulations are in effect.
- Establish mitigation to prevent exceedance of average noise standards so that courtship season is not disrupted.
- The EIS must address:
  - the extent and mitigation required for sagebrush habitat;
  - the mitigation standards for crucial winter range;
  - the use of 1-mile buffers around ferruginous hawk nest sites and burrowing owl nests;
  - implementation of a conservation community “blueprint” for Sage-grouse and Sage-grouse habitat throughout the project area;
- Screens should be fitted to burners on production facilities to prevent songbird deaths
- The overall scale of the project makes serious adverse impacts inevitable for wildlife, fisheries, and recreational opportunities. The following restrictions are requested on all development in the project area:
  - A minimum of 95-percent flareless completion on all wells
  - Directional drilling used to its full extent to reduce footprint and habitat fragmentation
  - Remote monitoring of condensate tanks
  - Bus crews rather than individual trips
  - Monitor and police traffic during critical winter range periods
  - Cluster well pads

## APPENDIX A—SUMMARY OF SCOPING COMMENTS

- Intensive mitigation to reduce noise and light pollution affecting Sage-grouse during strutting and parturition
- Dust abatement
- A minimum 3:1 ratio for off-site mitigation work to compensate for habitat fragmentation
- Reclamation with a forb/shrub mixture consisting of native plants and grasses, rather than the BLM grass mixture.
- Monitor and analyze habitats surrounding the project area to reevaluate habitat protections such as the width of buffer zones, to provide suitable habitat as development proceeds.
- Incorporate wildlife monitoring and research projects, funded by the operators.
- Apply any stipulations only where least restrictive and absolutely essential, and then only after they have been peer reviewed.
- COAs for directional drilling in sensitive areas should require BMPs in accordance with IMI2005-247 and IM2004-194, and the Gold Book, including but not limited to:
  - ACECs
  - lands with wilderness characteristics and sensitive or important wildlife habitat
  - closed-loop (pitless) drilling to help protect soils and water
  - requiring maximum use of existing roads
  - drilling multiple wells from a single pad
  - centralizing production facilities to reduce surface disturbance
  - noise reduction techniques and designs
  - wildlife monitoring
  - interim restoration to ensure lands are returned to their natural condition as soon as possible.
  - Collect baseline data and fund long-term monitoring.
- The Red Lakes Dunes citizen-proposed wilderness and other lands with wilderness characteristics should be inventoried and protected using VRM Class I or II designation, NSO limitations, and application of other BMPs.
- Include an aggressive noxious/invasive species control program (to protect forage).
- Attempt to mitigate vehicle-caused livestock losses due to increased vehicle traffic.
- Consider mitigation measures to prevent harm to agricultural water uses, including a detrimental drop in the water table.
- Require “green completions” for each new well and prohibit pit flaring during completion and fracking.
- Cease building new roads when maximum road densities are reached, until at least an equal amount of old roads are closed.
- Close and reclaim roads to dry well sites, completed wells, and where redundant or unnecessary.
- Address the use of on-site and off-site mitigation.
- Impose speed limits on heavily traveled roads where big game road kill is a concern.

## APPENDIX B: PLAN OF DEVELOPMENT

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### INTRODUCTION

The Continental Divide-Creston (CD-C) Operators submitted their Plan of Development (POD) for the CD-C project to the BLM in September 2006. The POD was subsequently revised in late 2007 to reflect a reduction in plans for coalbed natural gas (CBNG) development within the project area. The original POD had said that potentially 500 to 900 of the proposed 8,950 wells could be CBNG wells. The 2007 revision reduced that amount to “up to 500” CBNG wells. The 2007 version of the POD is the one reproduced in this appendix.

Since the submittal of the revised 2007 POD, other changes and clarifications have been made to the Operators’ development plans. Although no formal revision of the POD has been made, the changes have been incorporated into **Section 2.2.1** of the CD-C Environmental Impact Statement (EIS), The Proposed Action. The changes were most often made because of advances in drilling technology since the project was originally proposed or because the analysis of project impacts necessitated a more detailed definition of the Operators’ plans to adequately assess the effects. The changes occurred over the five years between 2007 and 2012 and were generally evolutionary in the way they developed, with frequent emails and phone conversations discussing the changes before a decision was made to alter the development proposal.

The Operators have agreed that the following descriptions of those changes and clarifications accurately reflect their intent and the POD is hereby amended as follows:

1. **Number of days required to drill a well.** The POD said that drilling each gas well “will take about 10 to 20 days” and that completion and testing operations typically will “require approximately 10 to 20 (up to 30) days.” Given the improvements in drilling technology, the drilling time for each gas well, as described in **Section 2.2.1.2** of the EIS, **Drilling and Completion**, has been reduced to “about 7 to 10 days.” The description of the time for completion and testing operations has been changed to “approximately 10 to 20 days.”
2. **Number of drill rigs active in the project area.** The POD anticipated that the number of rigs necessary to achieve development objectives “will range from about 34 to 70 rigs at any particular time.” As described in **Section 2.2.1.2, Drilling and Completion**, the Operators have reduced that count to “up to 25 rigs at any particular time,” largely because the time needed to drill a well has decreased.
3. **Compression and gas treatment facilities.** The Operators estimated in the POD that “one large central pipeline compression facility” may be required for the project and that “as many as ten additional compressor sites” and “individual well site compression” as needed would be added to the existing infrastructure. They also said that “Compression requirements and associated horsepower estimates will be developed in association with the air quality analysis.” In addition, “It is anticipated that two or more central gas processing/stabilization facilities will be needed.”

After considerable analysis and discussion, rather than trying to estimate the breakdown between the number, type, and size of compression facilities that would be needed, the Operators summarized compression needs in a single metric, the total amount of horsepower (hp) that would be required for future production. **Section 2.2.1.5** of the CD-C EIS, **Compression, Gas Treatment, and Ancillary Facilities**, now states that an estimated 24,936 hp of additional compression may be needed as the project is developed for dedicated compressor sites and for additional compression at well sites.

In addition, the number of new central gas-processing/stabilization facilities has been reduced from two to one.

## APPENDIX B—PLAN OF DEVELOPMENT

4. **Sources of water used for project development.** The POD describes the use of approximately 20,000 to 30,000 barrels of water per well for drilling operations (Section 4-1 of the POD), approximately 4,000 to 12,000 barrels of water for completion and testing operations (Section 4-4), and approximately 2,700 gallons of water to test each mile of four-inch gas pipeline (Section 5-2). This “water will come from existing and new water supply wells within the project area, as well as from produced water sources which will conserve fresh water aquifers. . . . Water from reserve pits may be transferred and used for drilling.” (Section 4-1)

The POD does not mention the use of any surface water and subsequent discussions with the Operators indicated that it was their intention that the statements in the POD were meant to exclude the use of any surface water.

5. **Use of fresh water.** Section 4-1 of the POD states, “Fresh water will used for drilling the first 5,000 to 7,000 feet of each gas well” and then references other uses of fresh water, including in Section 4-4, Completions and Testing. The Operators have clarified that only fresh water can be used when drilling surface casing by regulation. However, other processes may not involve the use of fresh water but rather the re-use/recycling of water depending on the quality of that water and the planned use and regulatory requirements.
6. **Disposal of produced water from CBNG wells.** Section 5.4 of the POD describes the process for disposal of produced water from CBNG wells, water that could be produced in volumes of 500–1,000 barrels per day per well. The volume of water produced in CBNG development is normally much greater than the amounts produced with conventional gas production. CBNG-produced water might “be stored on-site in a lined pit or storage tank, or water-collection lines might be installed to transport water to a water-treatment facility, evaporation ponds, injection wells, subsurface drip areas and/or approved discharge points.” The actual volumes produced and the methods by which the produced water would be managed are greatly dependent on the site-specific development proposals. For that reason, the BLM decided that although the POD for the CD-C project described the potential for surface discharge of CBNG-produced water, such disposal for any CBNG development within the CD-C project would be treated in a separate NEPA analysis. When the BLM receives site-specific CBNG proposals in the CD-C project area, the proposals, including the treatment of produced water, will be analyzed in a separate NEPA document at that time.
7. **Disposal of produced water from conventional wells.** Section 5.4 of the POD also describes the process for disposal of produced water from conventional wells, water that would be produced averaging 18 barrels per day per well. This water would be “disposed of via subsurface injection, surface evaporative pits, or will be used for potential beneficial use (i.e. drilling operations).” The POD does not mention the surface discharge of water produced from conventional drilling. Subsequent discussions with the Operators clarified that the statements in the POD were meant to indicate that the Operators had no plans for the surface discharge of produced water from conventional wells as a method of disposal.
8. **Water used for dust abatement.** The POD does not specifically describe the process of dust abatement, how much water might be used in the process, or where the dust abatement water would be sourced. Discussions with the Operators clarified that the 20,000 to 30,000 barrels of water per well for drilling operations described in Section 4-1 would include all water used for dust abatement. As described in Item 4 above, none of that water would come from surface sources.

## 1. General Project Description

### 1.1 PROJECT OVERVIEW

BP America Production Company and other operators (identified herein as the “Operators”) propose to develop natural-gas resources within the existing Continental Divide and Creston Blue Gap natural gas fields, located in Carbon and Sweetwater counties, Wyoming. The project, known as the Continental Divide-Creston Natural-Gas Development Project, involves approximately 1.1 million acres in an area with a “checkerboard” pattern of surface ownership. The Bureau of Land Management (BLM), the State of Wyoming, and private owners issued the oil and gas leases covering these lands. The Rawlins Field Office (RFO) manages BLM surface lands and the federal mineral estate in the Project Area, which is shown on Figure 1.

Oil and gas extraction in the Project Area is guided by relevant programmatic NEPA actions including the Great Divide Resource Management Plan (1990), and the decisions made in applicable project-specific BLM NEPA documents, including the Continental Divide/Wamsutter II Natural Gas Project and the Creston/Blue Gap Natural Gas Project. The BLM operates in accordance with the Federal Land Policy and Management Act of 1976 (FLPMA), which mandates that the BLM consider multiple uses for the lands it administers. FLPMA specifies that the BLM consider the land’s inherent natural resources as well as its mineral resources when making land management decisions. The BLM’s responsibility extends to environmental protection, public health, and safety associated with oil and gas operations on public lands. Mineral leasing decisions made by the BLM result in a contractual commitment from the United States to allow for exploration, development, and operations by the Operators in accordance with stipulations and restrictions incorporated within its leases. Lease rights include the right to occupy and use as much of the surface as is reasonably necessary to explore, develop, operate, and produce the subsurface oil and gas resources. The Operators understand that the decision that will result from NEPA analysis of this proposed project will pertain only to those areas in the Project Area where there are federal surface and/or federal minerals. The Operators recognize that the State of Wyoming and other local governmental agencies also have authority over various aspects of oil and gas development in all or portions of the Project Area.

Collectively, the Operators propose to drill approximately 8,950 wells in addition to the wells that currently exist in the Project Area. Up to 500 of the proposed wells could be coalbed natural gas (CBNG) wells. The Operators anticipate drilling infill wells at potentially up to 40 acres per downhole well bore. The Project Area contains several units in addition to non-unitized lands. The total number of wells drilled will depend largely on factors outside of the Operators’ control that affect the ability to adequately drain the reservoir, including geologic characteristics and reservoir quality, appropriate engineering technology, economic factors, commodity prices, availability of commodity markets, and lease stipulations and restrictions.

Based on current reservoir and well performance information, most gas wells will be completed in the Almond Formation (Mesa Verde Group); however, secondary reserves may be encountered in other formations (e.g. Lewis, etc.) for the natural gas wells. The CBNG development will primarily target formations such as the Fort Union (Big Red Coal) and secondary reserves may be encountered primarily in the Wasatch, Frontier, and Lance formations.

This proposal assumes that the gas wells may be drilled conventionally, i.e., with a vertical well bore on a single pad, or with multiple directional well bores from a single pad. The gas resource is primarily conventional natural gas, however, the project also includes development of CBNG. Directional drilling is not being proposed by the CBNG operators. All proposed wells are anticipated to be drilled during an approximate 10 to 15 year period after project approval. Although actual operations are subject to change as conditions warrant, the Operators’ long-term plan of development is to drill additional wells at the rate of approximately 600 wells per year or until the resource base is fully developed. The average life of a well is expected to be 30 to 40 years for both the conventional gas and CBNG development.



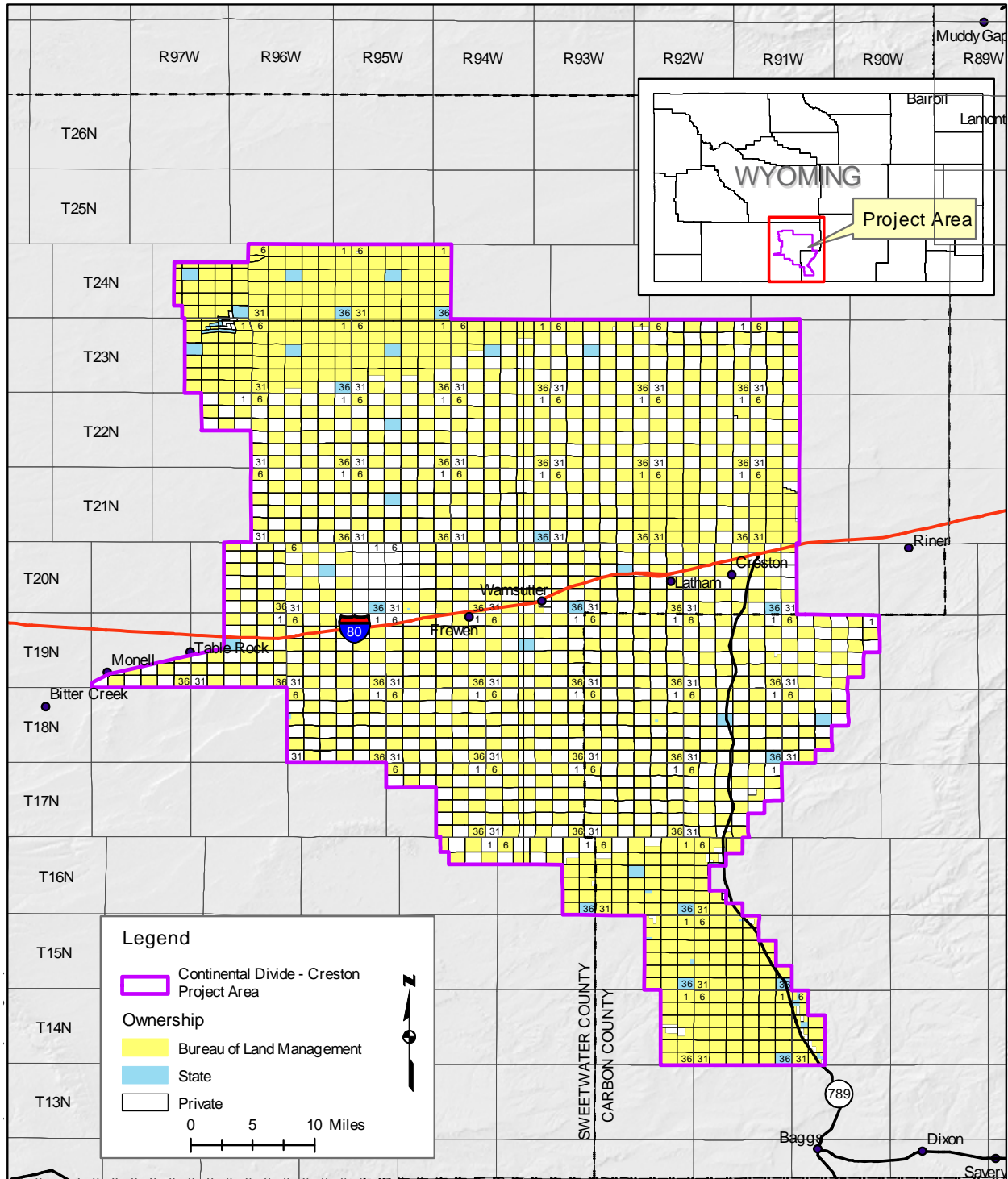
## APPENDIX B—PLAN OF DEVELOPMENT

The facilities required by the project may include roads, gas, water, and condensate gathering pipelines, overhead and buried powerlines, production facilities (separation, metering, treating, fluid storage, compression, artificial lift, etc.), disposal well and/or surface disposal facilities, equipment storage facilities, and other associated facilities. In general, gas will be transported via subsurface pipeline to centralized compression and treatment facilities although some well site compression may be included on an as-needed basis. Produced water will be transported by truck to water disposal wells or evaporation ponds, or by pipeline to treatment facilities and/or discharge points. CBNG development may require the use of various water management alternatives, which include but are not limited to; deep injection, evaporation ponds, water treatment (such as freeze thaw evaporation, reverse osmosis, ion exchange, etc), direct discharge, and sub-surface drip irrigation.

Project development will result in the use of new roads and roads previously constructed and currently used in the Project Area. New roads are expected to consist primarily of short access roads. Existing arterial roads will provide the main access to the Project Area. The project may also include the development of an overhead electrical system to provide commercial power to portions of the field, as well as lower voltage, buried power utilities to individual well pads. The overhead system is estimated to include approximately 36 miles of line. The construction disturbance width would be up to 25 feet. The overhead system would primarily follow existing road corridors and utility ROWs. The buried power utility to individual wells would be the responsibility of the Operators, and would be installed in the utility corridor adjacent to the well pad access road.

The Project Area includes approximately 1.1 million acres of mixed federal, state, and private lands. The BLM manages approximately 626,355 acres (59%), the State of Wyoming owns approximately 21,600 acres (2%), and private landowners own approximately 421,360 acres (39%). The Project Area is generally located within Townships 14 through 24 North, Ranges 91 through 97 West, 6<sup>th</sup> Principal Meridian. The eastern boundary of the Project Area is about 25 air miles west of the city of Rawlins. Interstate 80 generally crosses through the center of the Project Area.

## APPENDIX B—PLAN OF DEVELOPMENT



**Map 1. Continental Divide-Creston Natural Gas Development Project**

## 1.2 SUMMARY OF SURFACE DISTURBANCE

The Operators estimated projected surface disturbance using assumptions based on past experience and anticipated activities. A summary of the estimated project-related disturbance is shown in Table 1.

Project development will result in disturbance to the federal, state, and private lands upon which the project wells will be drilled. Disturbance of the land will result from the construction and use of new roads, the construction of well pads, the installation of subsurface pipelines, and the construction or expansion of compressor facility sites or other associated facilities. Short-term disturbance refers to initial disturbance prior to interim reclamation of the reserve pits, unused portions of the location and roads, and reclamation of the pipeline route. Long-term disturbance refers to disturbance of the surface associated with the life of a well in addition to the running surface of access roads.

For analysis purposes, the following assumptions were made:

- Average access road length will be 0.25 mile.
- Road disturbance width will be 55 feet, reclaimed to a running surface of 32 feet. Permanent road right-of-way is typically 50 feet.
- Initial disturbance associated with each well will average approximately 6.3 acres for single well pads, and 2.45 acres per well bore for multiple well pads. This acreage includes the associated road disturbance. The actual acreage per well bore on multi-well pads will vary based on the number of wells bores on the pad.
- Long-term disturbance associated with each well pad will be approximately 2.6 acres for single wells and 1.2 acres per well bore for multiple well pads. This acreage also includes the associated road disturbance.
- Average gas gathering pipeline length will be 0.25 mile.
- An average width of 25 feet will be physically impacted by utility construction, including gas, water pipelines, and power, which will be totally reclaimed after construction. Utility ROWs will be built adjacent to roads wherever possible and practicable. Operators may utilize a construction corridor of up to 75' for utility installation dependent on the specifics of a given location. These corridors will be addressed in the ROW and/or APD filing procedure.
- The overhead electrical system would be approximately 36 miles long, and have a construction disturbance width of up to 25 feet.

CBNG well pads have a smaller footprint than conventional wells, however, the acres of disturbance shown in Table 1 was calculated using conventional well pad dimensions due to the relatively small percentage of CBNG wells, and because the potential number of CBNG wells cannot be well defined at this stage of project development. CBNG well pads average about 3.8 acres during initial disturbance and 1.25 acres during operations.

Average access road length was estimated by taking into account that the proposed wells will be infill wells in an area that has an existing road system. Operators will be using the Transportation Plan to minimize construction of new roads; therefore, it is reasonable to assume that most new access roads will be constructed as laterals off existing roads. Consequently, the average new access road length was estimated at 0.25 mile.

The Operators intend to construct and install pipelines adjacent to well access roads, however, it will be necessary to construct a pipeline route cross-country at some locations. Pipeline routes will be reclaimed after construction such that all surface disturbances resulting from pipeline construction will be short-term disturbance. Long-term disturbance associated with pipeline construction is expected to be very minimal after reclamation is complete.

## APPENDIX B—PLAN OF DEVELOPMENT

The Operators will continue to limit long-term surface disturbance as much as possible through the implementation of a road network that minimizes the construction of new access roads and by reclaiming as much of the short term disturbance associated with roads and locations as is reasonable without limiting the requirements for ongoing and future production operations.

**Table B-1. Preliminary Estimate of Surface Area Disturbance<sup>1</sup>  
Continental Divide – Creston Natural Gas Project**

Facility Type	Initial (Short Term) Disturbance Area <sup>2</sup> (acres)	Area of Operations <sup>3</sup> (Long Term Disturbance Area) (acres)
Well Pad Sites <sup>4</sup>	41889	17998
Utilities <sup>5</sup>	4897	44 <sup>9</sup>
Water Management Facilities <sup>6</sup>	270	270
Compressor Facilities <sup>7</sup>	144	144
Total Disturbed Area	47200	18456
Percentage of the Total Project Area <sup>8</sup>	4.29%	1.68%
<p>1) This table represents the total area estimated to be disturbed at the Continental Divide – Creston Development Project during its 15-year construction and 30 to 40 year operational life.</p> <p>2) The initial disturbance represents the area disturbed as a result of drilling and associated construction of well pad sites, roads, gas, condensate, and water collection pipelines, compressor stations, and power supply systems.</p> <p>3) Following drilling and associated construction, part of the initial disturbance will be reclaimed. The area not reclaimed will be used for operations. Once the gas resource is extracted, facilities will be removed and the area reclaimed entirely.</p> <p>4) An estimated 8,950 natural gas well bores will be established in the project area.</p> <p><u>Initial (Short Term) Disturbance Area:</u> The initial well pad site disturbance for a vertical well will average 6.30 acres per well pad site which includes 0.9 of an acre for an access road. The initial disturbance for a directional well will average 2.45 acres per well bore completed including 0.45 acres for an access road (assumed 50% of the directional wells will need a new access road).</p> <p><u>Area of Operations (Long Term Disturbance Area):</u> Following drilling and well installation, reclamation will reduce the vertical well pad sites to approximately 2.6 acres which includes 0.9 of an acre for a road. Following reclamation, the long-term disturbance for directional wells is estimated at 1.2 acres per well bore which includes 0.45 acres for an access road (assumed 50% of the directional wells will need a new road).</p> <p>5) Utilities include gas, condensate, and water collection pipelines, as well as buried powerline facilities. Generally, these utilities will parallel the access roads. An average width of 25 feet will be physically affected by the installation of utilities. Actual utility corridor construction width will vary by operator and site conditions. Assuming 0.25 miles of utility installation for a well pad site, an estimated 0.75 acres will be disturbed with utility installation for the well pad sites. Overhead power includes an estimated 36 miles of line, requiring a 25-foot wide construction corridor.</p> <p>6) Water Management Facilities – water will be handled using a combination of evaporation ponds, enhanced evaporation, water treatment, and injection wells. An estimated 30 injection wells affecting an estimated 5 acre per well and an estimated 20 produced water handling facilities are planned affecting an estimated 3.5 acres per facility. An estimated 1-acre will be disturbed per site for access roads.</p> <p>7) It is assumed that one central pipeline compression facility, estimated to affect approximately 10 acres, will be required for the project. It is assumed that 10 additional compressor stations will be required for the project. An estimated five acres will be physically affected at each compressor station site. Each compression site will require an access road assuming 32 feet width for ½ mile estimated disturbance of 2 acres per road per site.</p> <p>It is assumed that two or more central Gas Processing/Stabilization Plants will be needed within the Project Area. Each is estimated to affect approximately 30 acres. Each site will require a ½ mile access road estimated at 2 acres disturbance.</p> <p>8) This percentage is based on the 1.1 million acres within the EIS analysis area.</p> <p>9) Once buried utilities are constructed, the disturbed area will be reclaimed in its entirety. Overhead powerlines will require a 10-foot wide permanent corridor.</p>		

## 2. Pre-Construction and Site Layout

Activities associated with the development may include access roads, pipeline and well pad construction, drilling and well completion, and any other ancillary facilities needed to develop the particular phase. Prior to the start of any construction activities involving a federal action on BLM managed public land, Operators will submit a site specific APD/Notice of Staking (NOS)/ROW application to the BLM that will detail the development proposal. The application will include a map showing the specific location of the proposed activities and site-specific construction plans. A Plan of Development (POD) may be submitted for multiple wells within the same area for CBNG.

The proposed development sites will be staked in the field by the applicant and inspected by the BLM to ensure consistency with the application. The appropriate NEPA documentation will be conducted to ensure that the proposal will comply with guidelines contained in the BLM's Rawlins Resource Management Plan (RMP) 2008, specific requirements contained in the EIS/Record of Decision for the project, and current BLM policy regarding oil and gas development.

Applications may be revised as necessary per discussions with BLM. The BLM may approve or deny site-specific proposals, and will attach any terms or conditions of approval to the permit. Upon receipt of BLM approval, the applicant can commence with proposed activities.

### **3. Construction Activities**

#### **3.1 ROADS**

Since the project is an infill development in an existing well field, new road construction is not expected to be extensive. The primary access to the project area is Interstate 80. Wyoming State Highway 789, several Sweetwater and Carbon county roads, and other smaller local roads provide access within the project area. New road construction will primarily be short sections of road from the existing road network to the individual new well sites and support facilities. Some existing access roads may need to have some improvements to accommodate the increase in traffic and heavy construction equipment such as widening or graveling.

The exact locations of proposed roads are not known at this time. Specific locations for access roads will be included in APD and ROW applications, and will be evaluated by the BLM during the onsite inspections. Road construction will be in accordance with guidelines specified in the BLM Road Standards Manual, Section 9113, and with construction standards in its Surface Operating Standards for Oil and Gas Exploration and Development (BLM Gold Book, revised 2006).

The construction width for access roads will typically be 55 feet. Standard cut and fill construction techniques will be used. Roads are usually crowned and ditched except where an operator or the BLM determine that the road can safely be constructed using less disruptive techniques. The permanent running width will not exceed 32 feet. Existing roads that require upgrading will meet standards appropriate to the anticipated traffic flow and all-weather requirements. Upgrading may include ditching, drainage, graveling, crowning, and capping the roadbed as necessary to provide a safe roadway. Maintenance practices may include dust abatement, road surface grading, and maintaining proper drainage. New roads may be graveled to accommodate year-round use, to allow the transport of heavy loads, and to minimize dust generation. Two-track roads may be constructed or utilized in some instances for access to smaller facilities. Access roads are planned to be reclaimed when no longer needed, unless the landowner or the BLM requests otherwise.

#### **3.2 WELL PADS**

The project will include the construction of 8,950 well bores from both single well pads and well pads with multiple directional well bores. Construction of a typical single well pad will require approximately 6.3 acres which includes 0.9 acres for an access road. A typical multiple well pad will disturb approximately 2.45 acres per well bore, which includes 0.45 acres for an access road. Figures 2 through 6 show examples of typical single and multiple well pads. Well pad layouts will vary between operators, but all will be constructed within the approved disturbance area.

Operators will determine the location of a proposed well by the location of the subsurface reservoir, the topography of the area, and WOGCC spacing rules. Dimensions of a drill pad will depend on topography and specific well needs. Well pads will be constructed using the native sand/soil/rock materials present. Mineral materials will not be required. Topsoil and native vegetation will be removed and stockpiled for use in the reclamation process. Balancing cut and fill areas will level locations. Construction practices may include ripping to achieve a level pad. Cut-and-fill slopes will be designed to allow for retention of the topsoil during reclamation and subsequent re-establishment of vegetation.

## APPENDIX B—PLAN OF DEVELOPMENT

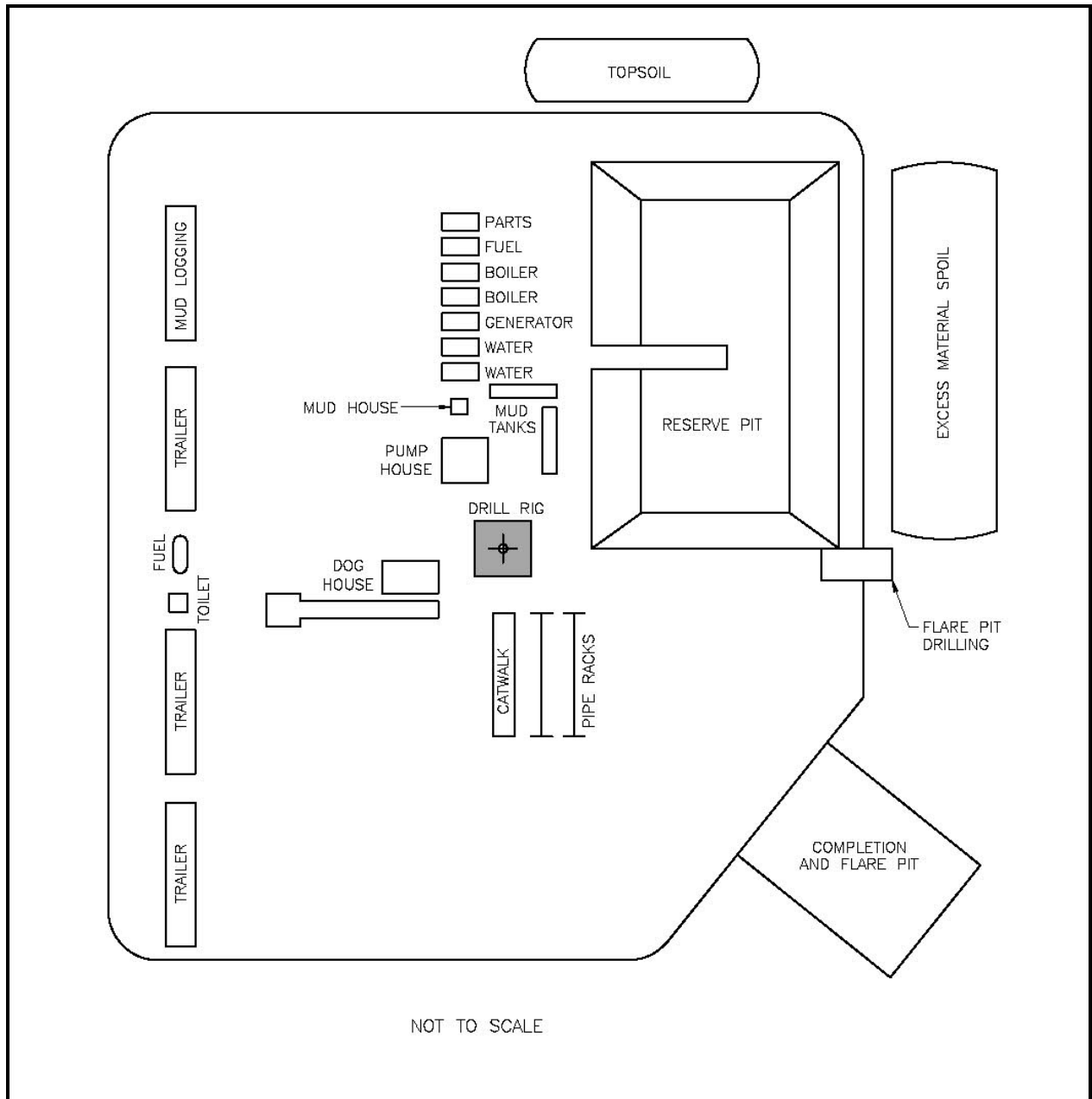


Figure B-1. Typical single well pad layout, example 1

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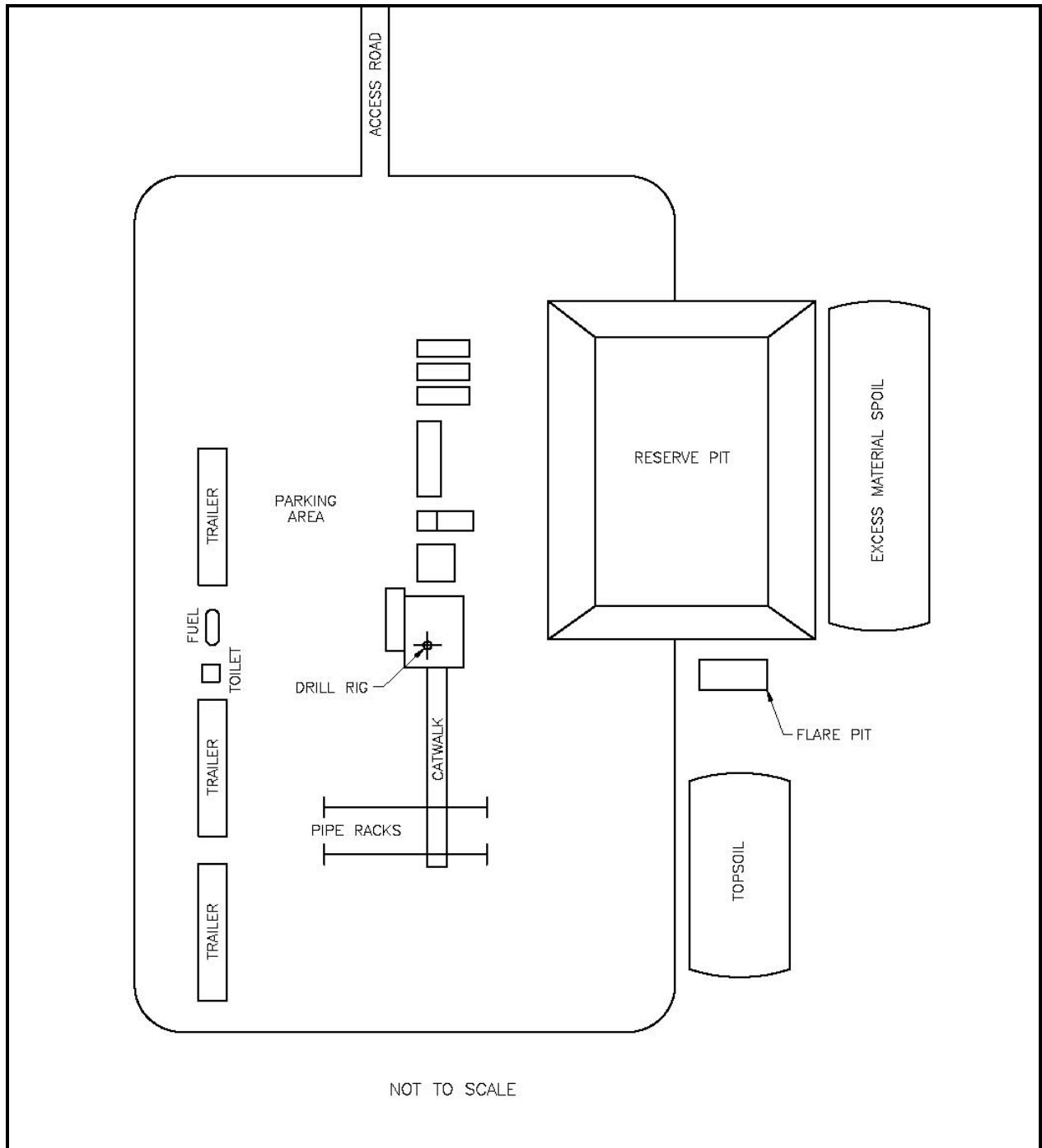


Figure B-2. Typical single well pad layout, example 2



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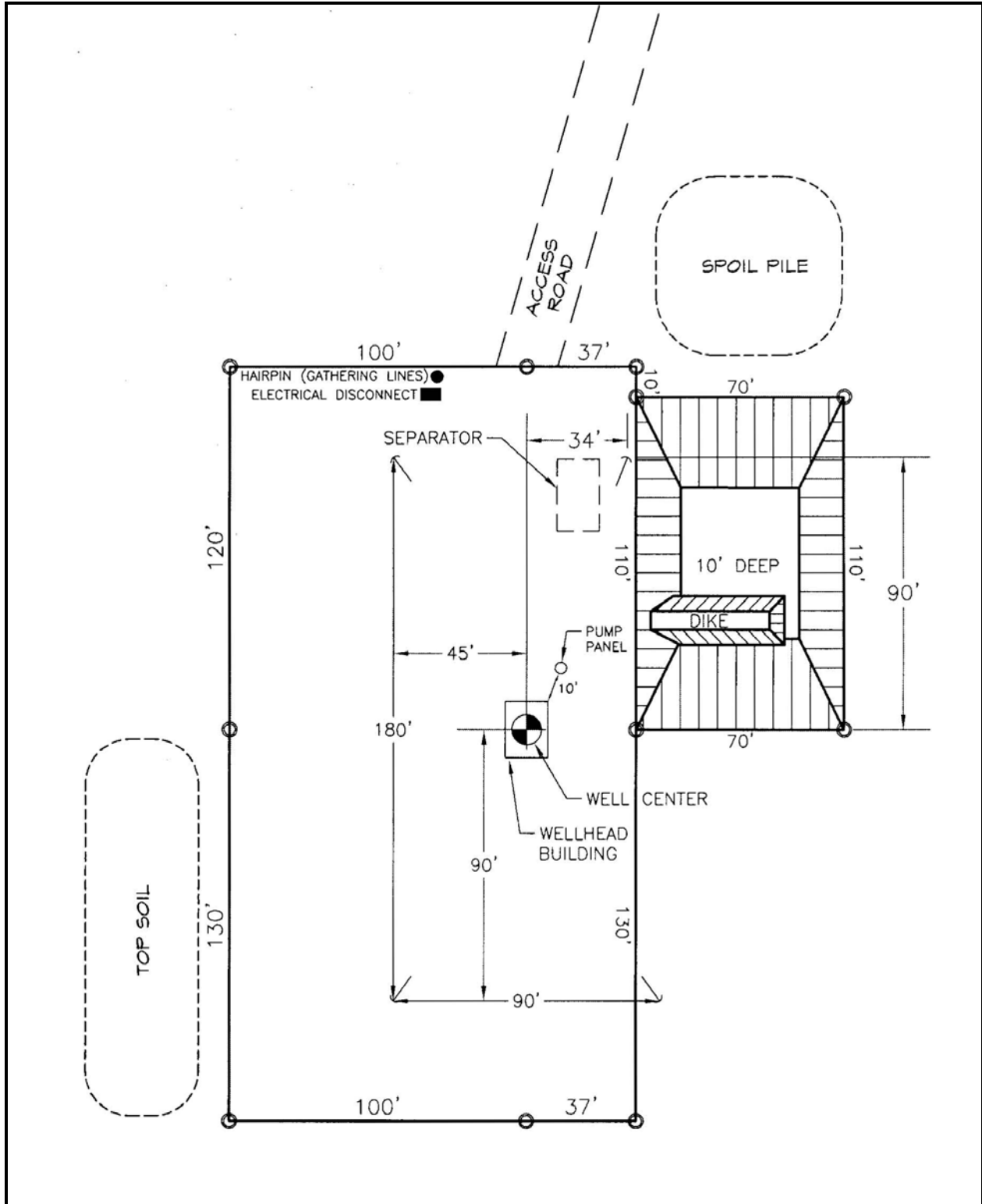


Figure B-3. Typical CBNG well site layout

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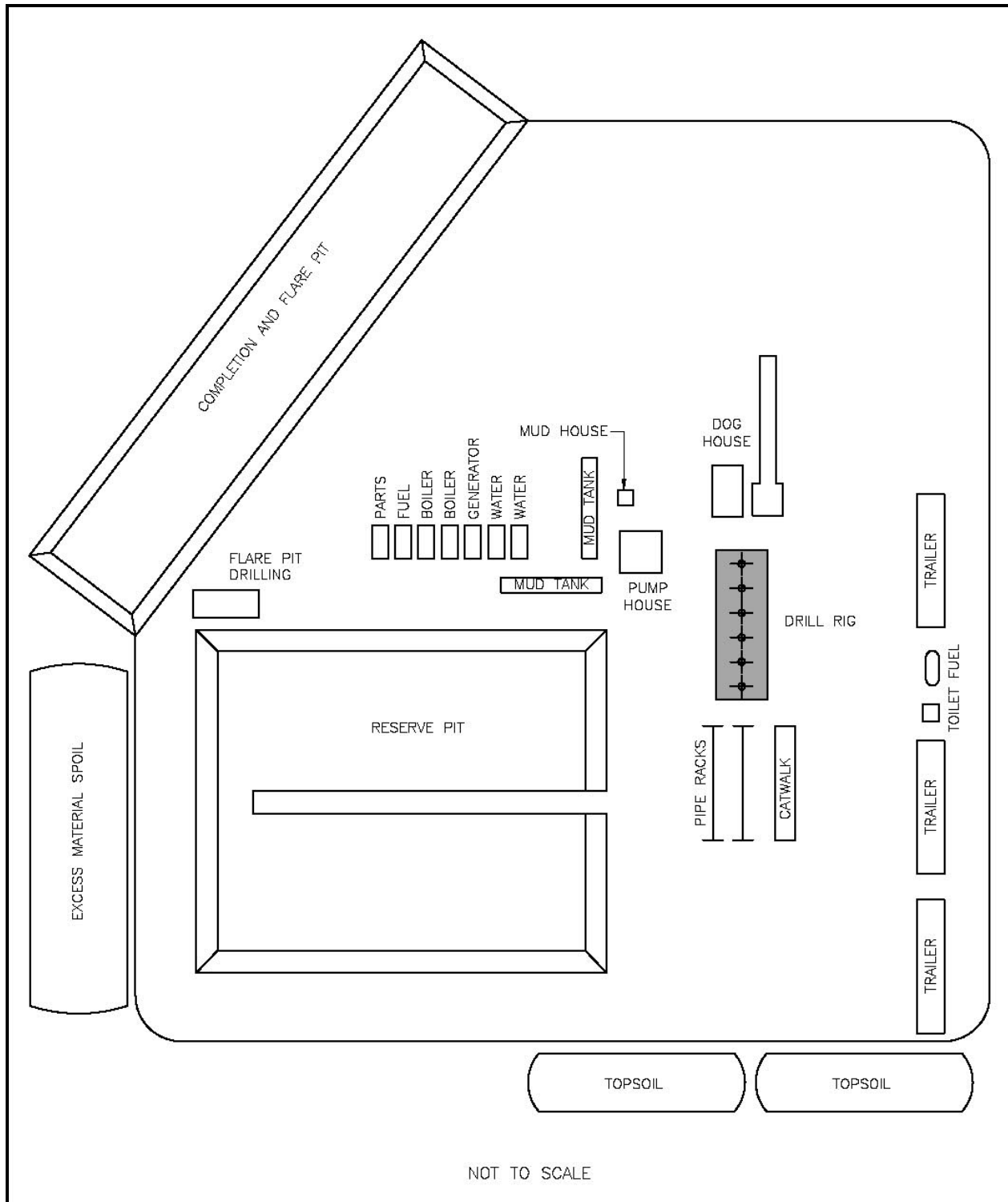


Figure B-4. Typical multiple well pad layout, example 1

## APPENDIX B—PLAN OF DEVELOPMENT

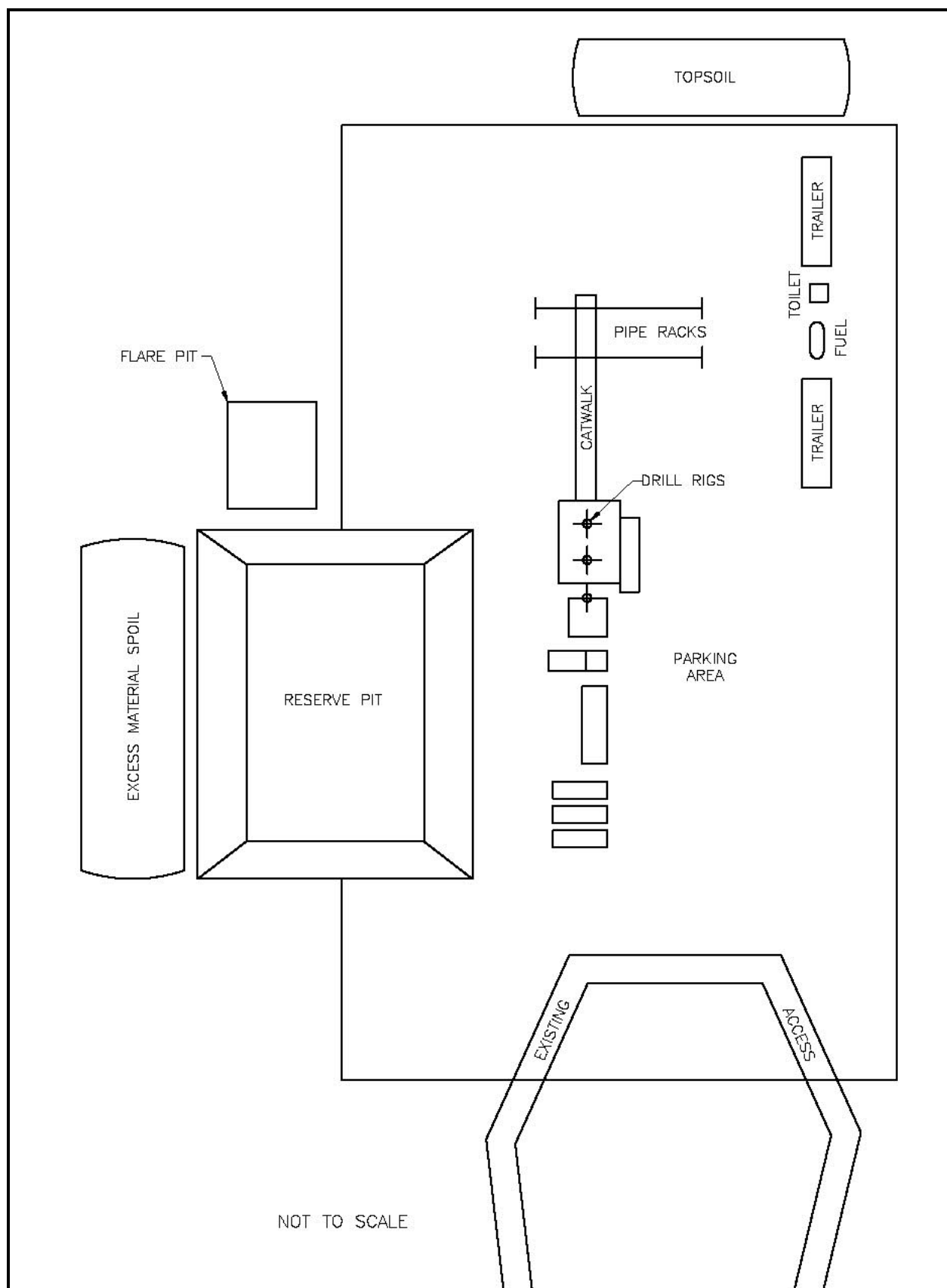


Figure B-5. Typical multiple well pad layout, example 2

## APPENDIX B—PLAN OF DEVELOPMENT

Typically a well pad will include a six to eight-foot wide cellar to allow access to casing heads, mouse and rat holes adjacent to the well bore to accommodate drilling operations, a flare or completion pit, and a reserve pit. A fenced reserve pit, approximately 10 to 12 feet deep, will be excavated within the pad to temporarily store drilling fluids and cuttings. The dimensions of the pit vary according to well depth and size and shape of location. In non-environmentally sensitive areas and when a fresh water-based drilling mud is used, the reserve pit may be unlined pending evaluation of the distance to surface water, depth to useable ground water, soil type and permeability, and anticipated types of fluids that will be contained in the pit. A reserve pit will be lined if so specified in the APD after the onsite evaluation. It will also be constructed in a way that minimizes the accumulation of surface runoff into the pit through the use of strategically placed subsoil/topsoil storage areas and/or the construction of berms and diversion ditches.

Both the access road and well pad are typically constructed within three to seven days, depending on terrain and site limitations. Depending on availability of equipment and specific well construction requirements, from two to eight individuals may be present on location during construction activities at any given time. Personnel will access the location using an average of 3 to 5 light trucks each day during construction of the access and well pad. Construction equipment varies but can include bulldozers, motor graders, scrapers, backhoes, and trenchers.

During operations, interim reclamation will reduce the size of the well pads to approximately 2.6 acres for a single well pad and to 1.2 acres per well bore for multiple well pads.

## 4. Drilling and Completions

### 4.1 DRILLING

Drilling operations will be conducted in compliance with all Federal Oil and Gas Onshore Orders, all WOGCC rules and regulations, and all applicable local rules and regulations. The Operators anticipate that the drilling rig count within the Project Area will range from about 34 to 70 rigs at any particular time in order to achieve development objectives.

Following construction of the access road and well pad, a drilling rig will be transported to the well site and erected on the well pad. Wells will be drilled utilizing a conventional, mechanically powered mobile drilling rig. The rig will be erected at the drill site after the conductor pipe has been set. Drilling operations will consist of drilling surface hole, running and cementing surface casing, drilling production hole, and running and cementing production casing. The rig may then be dismantled and demobilized from the location.

Fresh water will be used for drilling the first 5,000 to 7,000 feet of each gas well (500 to 1000 feet for each CBNG well), and water-based muds being used for the remainder of the drilling operation. Water will come from existing and new water supply wells within the project area, as well as from produced water sources which will conserve fresh-water aquifers. Operators will obtain all necessary permits for any water well drilling. Water from reserve pits may be transferred and used for drilling.

Drilling fluids will primarily consist of a fresh water/gel mixture with water being the main constituent. Reserve pits will be constructed so as to minimize the potential to leak, break, or allow discharge and in accordance with APD Conditions of Approval (COAs). The reserve pit will be fenced on three sides during drilling operations and on the fourth side when the rig moves off the location. Fences will be constructed according to BLM requirements on Federal surface and/or Federal minerals.

During drilling operations, a blow out preventor (BOP) will be installed on the surface casing to provide protection against uncontrolled surface blowouts should reservoir pressures exceed the hydrostatic pressure of the well bore fluid. In addition, a flow control manifold consisting of manual and hydraulically operated valves will be installed below the rig floor.

Prior to setting production casing, open hole logs may be run to evaluate production potential. If deemed economically justified, steel production casing will be run and cemented in place in accordance with the well design and as specified in the APD and COAs. Evaluation logs may be run subsequent to setting and cementing production casing in some cases.

The types of casing used and the depths to which they are set will depend upon the physical characteristics of the formations that are drilled and the pressure requirements anticipated during completion and production operations. All casing will be new or inspected.

Operators propose to drill year-round within the CD-C project area, subject to environmental considerations. Well development will include single wells and directional wells. Drilling each gas well will take about 10 to 20 days, with additional time likely for directional wells, and wells deeper than 10,000 feet. CBNG wells typically take 6 to 14 days to drill. Drilling operations require approximately 8 to 10 personnel and six vehicles on location at any given time each day during normal operations. An additional 10 to 15 personnel and six vehicles will be required on location during the running and cementing of production casing. Approximately 20,000 to 30,000 barrels of water are needed to perform drilling operations for both gas and CBNG wells. Operators propose to utilize produced water as appropriate as a conservation tool.

## **4.2 MATERIALS MANAGEMENT**

Potentially hazardous substances used in the development or operation of wells will be kept in limited quantities on well sites and at the production facilities as needed for operations. Materials will not be stockpiled at well locations. The transport, use, storage and handling of hazardous materials will follow the procedures specified by the Occupational Safety and Health Act and by the Department of Transportation (DOT) under 49 CFR, Parts 171–180. DOT regulations pertain to the packing, container handling, labeling, vehicle placards, and other safety aspects.

None of the chemicals that will be used meet the criteria for being an acutely hazardous material/substance or meet the quantities criteria per BLM Instruction Memorandum No. 93-344. Chemicals subject to reporting under Title III of the Superfund Amendments and Reauthorization Act in quantities of 10,000 pounds or more will not be used, produced, stored, transported, or disposed of annually during the drilling, completion, or operation of any well in the Project Area. In addition, no extremely hazardous substance, as defined in 40 CFR 355, in threshold planning quantities, will be used, produced, stored, transported, or disposed of while producing any well.

## **4.3 SOLID AND HAZARDOUS WASTE**

Most wastes that will be generated at project locations are exempt from regulation by the Resource Conservation and Recovery Act under the oil and gas exploration and production exemption and are considered to be solid wastes. These wastes include those wastes generated at the wellhead and through the production stream and gas plant. Exempt wastes include produced water, drilling mud, well completion/workover fluids, and soils affected by these exempt wastes.

Spills and releases can result in soils that are contaminated by produced water, petroleum products, or chemicals. The Operators will develop and maintain Spill Prevention Control and Countermeasure Plans for each well in the Project Area.

## **4.4 COMPLETIONS AND TESTING**

A typical cased well bore in the Project Area consists of conductor pipe, surface casing, and production casing. The surface and production casing/cementing programs will be designed to isolate and protect shallower formations and aquifers from the production stream and to minimize the potential for migration of fluids and pressure communication between formations.

A cementing plan is submitted with the drilling plan as part of the APD. This plan is reviewed by the BLM and/or the Wyoming Oil and Gas Conservation Commission. The BLM can request additional information or apply COAs relating to the cementing plan if necessary.

Once production casing has been cemented in place, the drilling rig may be released and completion operations will commence utilizing a well servicing rig or coiled tubing unit. In some cases completions can be performed by the drilling rig. Initial completion operations may also be conducted “rigless,” utilizing cased hole wireline equipment rather than a well servicing unit or coiled tubing unit, until such time that production tubing is installed in the well or other operational requirements dictate the use of a well servicing rig. In general, the completion of the well will consist of perforating the production casing, productivity and/or formation pressure testing if deemed necessary, stimulation of the formation(s) utilizing hydraulic fracturing technology, flow back of fracturing fluids, flow testing to determine post fracture productivity, and installation of production equipment to facilitate hydrocarbon sales.

Hydrocarbons and water production rates are typically quantified and flared during testing operations, which are conducted on an as-needed basis. Flareless or reduced flaring technology may be utilized for well completions if appropriate. Hydraulic fracture stimulation is required on the majority of wells in the Project Area in order to enhance productivity. Numerous combinations of fluids and proppants have been

## APPENDIX B—PLAN OF DEVELOPMENT

used historically in the Project Area in the effort to optimize stimulation results. Currently, the most common stimulation technique utilizes gelled fresh water (with CO<sub>2</sub> and/or N<sub>2</sub> frequently added for reservoir protection and enhanced flow back) and fracture proppants to provide the bridging and increased permeability necessary for productivity improvement. Sand, resin-coated sand, ceramics, or bauxite can be used as proppants in the stimulation process, depending on the design criteria of individual treatments. Gels and other chemical additives are utilized to provide the fluid viscosity necessary to ensure successful stimulation. The fracturing fluid is pumped down the well bore through the perforations in the casing, and into the formation. Sufficient rate and pressure are reached to induce a fracture in the target formation. The proppant carried in the fluid serves as a bridge to keep the created fracture open and to provide a flow path that allows reservoir fluids to move more readily into the well bore. Water used for stimulation purposes generally comes from water supply wells. Stimulation fluids recovered during flow back and subsequent production operations are temporarily contained in the completion, flare, or reserve pit.

Post stimulation flow tests allow for recovery of stimulation fluids and evaluation of well productivity. Duration of the tests will vary depending on individual well performance but typically are conducted only long enough for fluid rates to drop to a level that permanent production equipment can safely process. Gas is commonly flared during the flow back process and is measured using choke nipple calculations or through a temporary flow test separator and metering facility. Flaring takes place at the end of a horizontal flow line placed at a temporary pit designed for that specific purpose or at a vertical flare stack. Flaring occurs at a distance from the wellhead that ensures equipment and structure protection and personnel safety. Following the initial flow period, the well may be shut in until facilities are in place to allow the well to be placed on sales. In some cases, production facilities will be installed prior to completion in order to provide the capability of turning the well to sales immediately following testing. Alternatively, if flareless or reduced flaring completions technology is utilized, production facilities and flowlines will be installed prior to well completion. Special separation equipment is then needed to process the flowback to remove sand and fluids thereby allowing the gas to be turned to pipeline for sales rather than sent to flare. Fluids, primarily water, recovered during flow back operations are contained in the completion pit until they are disposed of at evaporation ponds, disposal wells, or evaporated on location.

Current technology allows for CBNG wells to be stimulated with high-pressure water and frac sands. After the well is completed, the well is either vented temporarily to atmosphere or directly tied into the gathering system. The water and CBNG will be separated downhole.

Completion and testing operations typically require approximately 10 to 20 (up to 30) days to perform, 2 to 30 personnel, and 1 to 20 vehicles on location. Approximately 4,000 to 12,000 barrels of water per well will be needed for completion and testing operations.

In the event a well proves to be uneconomic, the Operator will plug and abandon the well in accordance with federal and state regulations.

### 4.5 INTERIM RECLAMATION

On producing wells, the reserve pit will be reclaimed per the requirements specified in the approved APD. Reserve pits may be re-used for multiple wells being drilled from a single pad. Plastic liners, if used, will be buried onsite. The reserve pit, that portion of the location and access road not needed for production operations, and pipeline corridors will be reclaimed according to the requirements specified in the approved APD and COAs. Locations and roads will be reclaimed and reseeded back to the minimum size required as soon as possible after the well is put into production. CBNG well pads will also be reclaimed to a smaller size after the initial drilling phase, but roads typically stay at the construction dimension due to their initial minimum construction footprint. Each Operator may have a slightly different restored configuration based on original disturbance and the number of wells drilled on location. Figure 7 shows an example of a well pad layout after interim reclamation.

## APPENDIX B—PLAN OF DEVELOPMENT

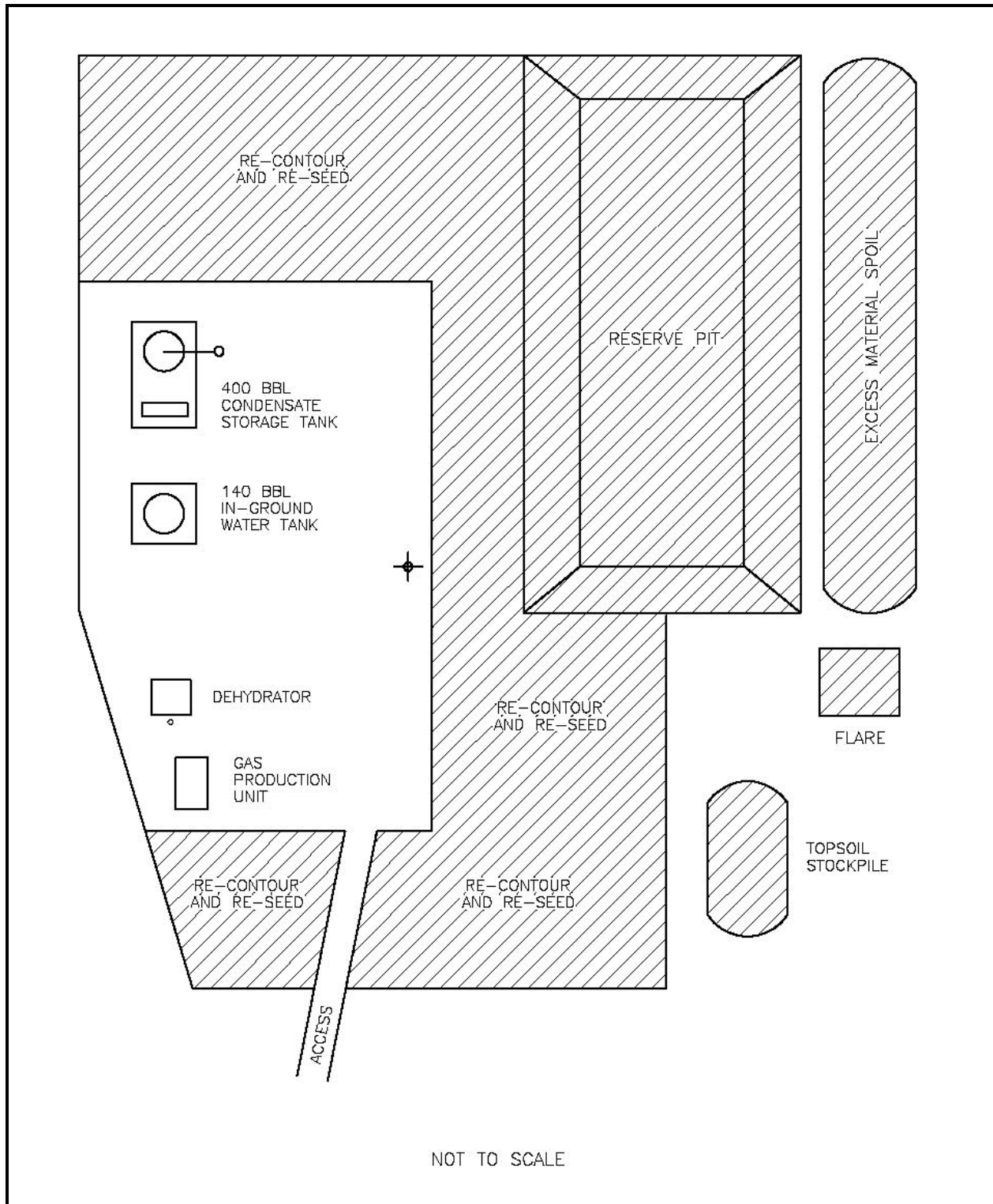


Figure B-6. Well pad after interim reclamation



## **5. Production and Maintenance**

### **5.1 WELL PRODUCTION FACILITIES**

Well production facilities will be installed as shown on the approved APD, with secondary containment structures built to conform to BLM, state, and federal requirements. Facilities on the well pad will typically include wellhead valves and piping, separation, dehydration, metering equipment, oil and water production tanks, a methanol storage tank and pump, and telemetry equipment. Production equipment will be fueled by natural gas or electricity. Telemetry equipment is currently used or planned for use by most Operators to improve well evaluation, operational efficiency, and to minimize well visits. Production pits will not be used. Well site compression may be utilized on an as-needed basis.

CBNG wellhead equipment may be run on diesel generators until an adequate flow of gas is present to run a gas-fired engine. Electricity may be provided to some CBNG sites in the future.

Artificial lift is equipment that is installed when production volumes drop to a level that prevents efficient removal of liquids from the well bore using reservoir energy alone. Artificial lift is presently limited to the use of plunger lift equipment, which is a passive hydraulic means of removing liquids from the well bore and does not require any increase in the disturbed surface area. Gas lift, downhole pumps, or other technology may also be employed.

All constructed or installed permanent structures (on site six months or longer) will be painted a flat, non-reflective earth-tone color as specified by the BLM. All new project facilities requiring painting will be painted within six months of installation.

### **5.2 PIPELINES**

The Operators will continue to utilize the existing natural gas transmission lines that serve the Project Area. Operators are not responsible for the construction or operation of gas transmission lines, and new transmission lines are not included as a component of the Operators proposed project.

Gathering lines will be installed below the surface to transport the produced gas from the new wells to the gas gathering pipeline system. The gas production lines will be located adjacent and parallel to well access roads where possible to minimize surface disturbance. The exact location of a gathering line will be determined at the time of the onsite with the appropriate surface management agency. The new pipelines are expected to cross federal, state, and private surfaces in a route developed to minimize both resource conflicts and development costs within the Project Area. Approximately 45 miles of high-pressure gas lines may be installed to service multiple CBNG wells in the northwest portion of the project area. This pipeline will generally run in a north-south alignment from Wamsutter north to the Hay Reservoir area.

Pipeline construction consists of trenching, pipe stringing, bending, welding, coating, lowering pipeline sections into the trench, and backfilling. Construction operations will be confined to the ROW corridor approved in the ROW application which is variable between operators. In general, construction widths will be 50 to 75 feet when not adjacent to a road and 25 to 50 feet when adjacent to an existing or new road. Pipes installed adjacent to road ROWs are constructed outside of the borrow ditch to minimize safety concerns. The pipeline trench will be mechanically excavated with a backhoe or trencher to a minimum depth of 48 inches. The trench will be approximately 18 to 20 inches wide. Newly constructed pipelines will be hydrostatically tested to ensure structural integrity. As an example of water requirements, approximately 2,700 gallons of water will be required to test one mile of four-inch pipeline. Hydrostatic test water will be disposed of as approved by the BLM and/or the State. Pipeline corridors will be reclaimed as specified in the COA authorization. Pipelines installation will result in short term disturbance until reclamation is considered complete.

### **5.3 COMPRESSION, GAS TREATMENT, AND ANCILLARY FACILITIES**

The existing compression infrastructure, however, will be unable to provide sufficient capacity to compress the additional gas volumes anticipated from the proposed wells. Additional compression will also be required if the Operators conclude that a reduction in gas gathering system pressure is needed at some point during the life of the project. Additional compression will be added to existing compression infrastructure where appropriate. Additionally, the Operators estimate that one large central pipeline compression facility, affecting approximately 10 acres, may be required for the project. Peak production is expected to occur in the 11<sup>th</sup> year after project approval. As many as ten additional compressor sites at 5 acres per site could be required to accommodate the maximum anticipated compression growth. Compression requirements and associated horsepower estimates will be developed in association with the air quality analysis.

Well site compression is utilized infrequently in the Project Area; however, individual well site compression could be needed on a limited basis. Well site compression will be installed on the existing well pad resulting in no additional disturbance. Well site compression typically uses 125 to 200 hp two-stage compressors. Gas fueled compression equivalent to 2500 HP per pilot will be required during the pilot phase for some of the CBNG development. Pilot testing will last for three years. Eight pilots can be expected within the EIS boundary area.

It is anticipated that two or more central gas processing/stabilization facilities will be needed within the Project Area. It is estimated that each of these facilities could affect 30 acres.

The Operators will utilize the existing facility infrastructure within the Project Area to the extent possible, including power lines and gas gathering and transmission pipelines.

### **5.4 PRODUCED WATER DISPOSAL**

Produced water from conventional production may be stored in tanks at the well site prior to transport by water hauling trucks or transported in flowlines to collection facilities for disposal. Produced water will be disposed of via subsurface injection, surface evaporative pits, or will be used for potential beneficial use (i.e. drilling operations). Conventional wells average 18 bbls/day or produced water. Produced water, condensate and gas will be separated at the well site or at central facilities. The proposed development includes a percentage of CBNG wells. CBNG wells can produce from 500 to 1000 bbls/day of produced water. Produced water and gas will be separated at the well site. Water may be stored on-site in a lined pit or storage tank, or water collection lines may be installed to transport water to a water treatment facility, evaporation ponds, injection wells, subsurface drip areas and/or approved discharge points. Water gathering lines of various sizes will be installed adjacent to roads/gas pipelines. Any surface discharge of produced water from CBNG wells is regulated under a National Pollutant Discharge Elimination System (NPDES) permit issued by the Wyoming Department of Environmental Quality (WDEQ). Produced water quality will be monitored in accordance with State and Federal regulations.

### **5.5 MAINTENANCE**

New wells will typically be visited daily but possibly less frequently after well performance has stabilized and telemetry equipment is installed.

Road travel will be restricted to the width of the running surface of the road. Maintenance on project roads during drilling and construction will be the responsibility of the Operators and will be consistent with the Transportation Plan, annual road plan, well-specific project plan, and BLM specifications. During the duration of the proposed project, the Operators will monitor the project roads and perform appropriate repairs. Repairs may be necessary to correct excessive soil movement, rutting, braiding around problem areas, and/or damage to cattle guards or gates.

## **APPENDIX B—PLAN OF DEVELOPMENT**

### **5.6 WORKOVERS**

Periodically, a workover on a well may be required. A well servicing rig is generally utilized during workover operations to perform various tasks such as well bore or surface equipment repairs, reservoir evaluation, or stimulation treatments to restore or enhance well performance. Workover operations are typically performed during daylight hours and are of short duration; however, depending on the scope of the work to be performed, workover operations can sometimes take from several days to several weeks to be completed. Unless fracture stimulation is necessary, workover operations typically require from five to 10 workers on location at any given time. During fracture treatments, an additional 10 to 20 individuals could be present on location. Additional surface disturbance is rarely necessary to conduct workover operations. Approval from the BLM Authorized Officer (AO) will be requested should the need for new surface disturbance arise.

### **5.7 GEOPHYSICAL OPERATIONS**

Seismic surveys have been conducted on some portions of the CD-C Project Area in the past. Additional seismic surveys are currently being planned and are needed to further define the subsurface to facilitate the extraction of leased oil and gas resources. Proposed seismic surveys are currently under analysis in a separate BLM NEPA review, and are not included in this proposal.

## 6. Reclamation and Abandonment

Abandonment of the well and its facilities will be performed in compliance with applicable federal and state regulations as well as the COAs to the APDs. Seed mixtures applied during rehabilitation operations will comply with the specifications of the appropriate surface management agency. The Operators will cut off the casing at the base of the cellar or three feet below the final graded ground level, whichever is deeper, and cap the casing with a minimum of 0.25 inch thick metal plate. The cap will be welded in place with the well name and location engraved on the top. The cap will be constructed with a weep hole.

All surface equipment will be removed from the site. The surface will be recontoured to its original appearance, to the extent possible. Topsoil will be distributed above the former location to blend the site in with its natural surroundings. All surface disturbance will then be planted with a seed mixture as specified by the appropriate surface management agency. Reclaimed sites will be monitored to ensure erosion is prevented and the desired plant species are being re-established. Monitoring will continue until the reclamation is deemed successful, which will be defined in the project reclamation plan.

## 7. Operator-Committed Practices

The Operators will adhere to all lease and APD conditions in addition to all federal and state laws, regulations, and policies implemented through statute and/or resource management planning decisions implemented through NEPA. According to BLM IM No. 2004-194, best management practices to be considered in nearly all circumstances include the following:

- Interim reclamation of well locations and access roads soon after the well is put into production;
- Painting of all new facilities a color which best allows the facility to blend with the background, typically a vegetated background;
- Design and construction of all new roads to a safe and appropriate standard, “no higher than necessary” to accommodate their intended use; and
- Final reclamation recontouring of all disturbed areas, including access roads, to the original contour or a contour that blends with the surrounding topography.

The Operators commit to performing these environmental protection measures during the implementation of their proposed project.

## APPENDIX C: BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

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### BEST MANAGEMENT PRACTICES

BLM describes best management practices (BMPs) as “state-of-the-art mitigation measures applied to oil and natural gas drilling and production to help ensure that energy development is conducted in an environmentally responsible manner.” The aim of BMPs is to protect wildlife, air quality, landscapes, and other natural resources as energy resources are developed. BMPs tend to be general principles for resource protection and are not in themselves regulatory in nature.

BLM’s policy is that all “Field Offices consider BMPs in National Environmental Policy Act (NEPA) documents to mitigate anticipated impacts to surface and subsurface resources, and also to encourage Operators to actively consider BMPs during the application process.” (Instruction Memorandum No. 2004-194; June 22, 2004) Substantial information on BMPs can be found on BLM’s national website at: [http://www.blm.gov/wo/st/en/prog/energy/oil\\_and\\_gas/best\\_management\\_practices.html](http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html).

Another important source of information on BMPs is the publication *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development* (commonly referred to as The Gold Book), which was developed to assist Operators on the requirements for obtaining permit approval and conducting environmentally responsible oil and gas operations on Federal lands. It is available online at: [http://www.blm.gov/wo/st/en/prog/energy/oil\\_and\\_gas/best\\_management\\_practices/gold\\_book.html](http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html)

BMPs that may have particular application to the Rawlins Field Office can be found in the following parts of the Rawlins Resource Management Plan (RMP) (BLM 2008):

- Appendix 1—Wyoming Bureau of Land Management Mitigation Guidelines for Surface Disturbing and Disruptive Activities
- Appendix 13—Reducing Nonpoint Source Pollution with Best Management Practices
- Appendix 15—Best Management Practices for Reducing Surface Disturbance and Disruptive Activities
- Appendix 16—Mountain Plover Management Guidelines: Occupied Habitat Protection Measures
- Appendix 24—Mitigation Guidelines for Special Status Plants

These appendices and the entire Rawlins RMP Record of Decision can be found at:

[http://www.blm.gov/wy/st/en/programs/Planning/rmps/rawlins/rod\\_armp.html](http://www.blm.gov/wy/st/en/programs/Planning/rmps/rawlins/rod_armp.html)

BMPs are often expressed in natural gas leaseholders’ plans of development, in reclamation plans, or, attached to approved Applications for Permit to Drill, as Conditions of Approval, which are described below.

### APD CONDITIONS OF APPROVAL

In the process of acquiring permission to drill to a federal oil and gas lease, leaseholders submit an Application for Permit to Drill (APD) to the BLM Field Office that manages the public lands where their lease is located. Included with the APD are:

- a drilling plan that contains a description of the leaseholder’s drilling program, geologic data, expected hazards and proposed mitigation measures to address such hazards;
- a surface use plan of operations that describes the locations of the drillpad and the access road, details of pad construction, and methods for containment and disposal of waste material; and
- a reclamation plan, which includes a weed management plan.

## **APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL**

When the BLM has completed the necessary environmental and technical review of the proposal contained in the APD, the BLM may approve the APD (or right-of-way application) as submitted or, more typically, approve the APD subject to Conditions of Approval (COAs) (or terms and conditions in the case of a right-of-way grant).

COAs are attached to an approved APD to ensure environmental protection, safety, and/or conservation of the mineral resource. They arise from a variety of controlling authorities such as the Federal Land Policy and Management Act (FLPMA), the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA). The COAs attached to an APD can be general in nature or site-specific, and thus will vary from one BLM Field Office to another. Typically, a Field Office develops COAs over a number of years of active management of oil and gas development. Often the Field Office RMP provides either a listing of potential COAs or the BMPs that might guide development of site-specific COAs in that area. They can address topics as wide-ranging as protection of wildlife habitat or archeological and paleontological sites, noise reduction, wildfire suppression, or management of invasive species. A BLM study of a number of Field Offices that manage oil and gas development identified 175 different types of COAs that are used to mitigate surface-disturbing activities. (BLM 2006c) Following is a master list of COAs that are used in the Rawlins Field Office when considering APDs. The list is adapted as needed for site-specific use. Many of the items listed will not be used on a specific APD if not warranted. If, on the other hand, conditions call for requirements that are not on the list, BLM specialists can add new COAs. The list is presented in the standard format used for attachment to an approved APD.



## CONDITIONS OF APPROVAL

### APPLICATION FOR PERMIT TO DRILL

Operator	<b>XYZ Natural Resources, LLP</b>	Well Name/No.	<b>Magic Mountain Federal 123</b>
Lease No.	<b>WYW-999999</b>	Legal Description	<b>NE¼, NE¼, Sec. 37, T 00 N, R 99 W</b>

#### GOVERNMENT ADDRESS

USDI, BUREAU OF LAND MANAGEMENT	FIELD OFFICE	Rawlins
	ADDRESS	1300 North Third Street P.O. Box 2407 Rawlins, WY 82301
	OFFICE PHONE	(307) 328-4200
	OFFICE HOURS	7:45 a.m. to 4:30 p.m. (Monday - Friday)

#### ACTIONS REQUIRING BLM NOTIFICATION

For construction, reclamation, and spud notices, submit via the internet at: [www.wy.blm.gov/rfo/og.htm](http://www.wy.blm.gov/rfo/og.htm)

For running casing, cementing, BOPE tests, drill stem tests or other notices, call the following number 24 hours in advance of commencing operations and leave voice message with call back number. **(307) 328-4276 (voice mail)**

#### AUTHORIZED OFFICER REPRESENTATIVE CONTACTS

If you seek immediate approval or emergency assistance on any action that is related to the APD **Surface Use Plan**, contact the Natural Resource Specialist listed below.

If you seek immediate approval or emergency assistance on any action that is related to the APD **Drilling Plan** or other down hole issues, you should contact the Petroleum Engineer listed below.

Natural Resource Specialist

Petroleum Engineer (Primary Contact)

In the event the Petroleum Engineer named above is unavailable, please contact **one** of the following:

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

Petroleum Engineer (Second Contact)

Petroleum Engineer (Third Contact)

Work Phone (307) 332-9999

Home Phone (307) 332-9999

***A COMPLETE COPY OF THE APPLICATION FOR PERMIT TO DRILL, THE CONDITIONS OF APPROVAL, and APPLICABLE MAPS MUST BE FURNISHED TO YOUR FIELD REPRESENTATIVE AND BE AVAILABLE ON SITE DURING CONSTRUCTION AND DRILLING ACTIVITIES.***

Rev. 2007-05-01

### GENERAL

1. Approval of this Application for Permit to Drill (APD) does not warrant that any party holds equitable or legal title.
2. All lease exploration, development, construction, production, operations, and reclamation activity shall be conducted in a manner which conforms to all applicable federal, state, and local laws and regulations.
3. All lease operations are subject to the terms of the lease and its stipulations, the regulations of 43 CFR Part 3 100, Onshore Oil and Gas Orders, Notices to Lessees (NTL's), the approved APD, and any written instructions or Orders of the Bureau of Land Management (BLM) Authorized Officer (AO).
4. The approval of this APD does not grant authority to use off-lease federal lands. Facilities approved by this APD and/or Sundry Notices that are no longer included within the lease, due to a change in the lease or unit boundary, will be authorized with a right-of-way. Similarly, should unit or lease boundaries change during the life of the project, the Operator will be responsible for acquiring necessary rights-of-way for affected facilities. Failure to do so may cause the operation to be shut-in.
5. This permit is valid for a period of two years from the date of APD approval or until lease expiration or termination, whichever is sooner. APD extensions may be requested and granted for up to two additional years, but not to exceed a total sum of four years from the initial APD approval date. Should a permit extension be requested, it must be submitted prior to the permit expiration date via a Sundry Notice (Form 3160-5) to the AO for approval. If the permit terminates, any surface disturbance created under the application shall be reclaimed in accordance with the approved reclamation plan found herein.
6. The Operator shall submit a Sundry Notice (Form 3160-5) to the AO for approval prior to beginning any new surface-disturbing activities or operations that are not specifically addressed and approved by this APD.
7. The Operator may submit to the AO's Representative written requests (including documentation, supporting analysis and an acceptable plan for mitigation of anticipated impacts) for exception, waiver, or modification to this approved APD, associated Conditions of Approval (COA), or other requirements. Such written approval shall be obtained prior to commencement of operations that cause any deviation from the approved APD and associated limitations. Emergency approval may be obtained orally, but such approval does not waive the written reporting requirement.

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

8. At **least 48 hours prior to** beginning any APD-related construction (e.g. access road, well pad, pipeline) and/or reclamation activities (e.g. dirt-work, seeding) the Operator shall notify the BLM via internet notice.
9. All construction of the well pad, flare pit, reserve pit, roads, flow lines, production facilities, and all associated infrastructure on federal lands shall be monitored onsite by a licensed professional engineer OR designated qualified inspector (to be named at the time of construction notification) who will serve as the Operator's Compliance Coordinator to ensure construction meets the BLM-approved plans.
10. Within **24 hours** of spudding the well, the spud date shall be submitted to the BLM via internet notice. A follow-up report on Form 3 160-5 confirming the date and time of the actual spud shall be submitted to this office within 5 working days from date of spud.
11. At **least 24 hours in advance** of all BOP tests, running and cementing all casing strings (other than conductor casing), pluggings, DST's and/or other formation tests, and drilling over lease expiration dates, notification shall be submitted to the BLM via internet notice.
12. Prior to construction, the Operator shall submit a production facility layout for approval (Onshore Order 1, Section 111. D.4.d. and D.4.i., or Section VIII. A.) that includes permitted location boundaries, production facility placement, access road inlet, and cut/fill slopes.
13. A site facility diagram (Onshore Order 3, Section 111. I. and 43 CFR 3 162.7-5(d)) for the purpose of a site security plan (Onshore Order 3, Section 111. H. and 43 CFR 3 162.7-5(c)) shall be filed no later than 60 calendar days following first production.
14. Use of any tank heater/burners in production storage tanks must be approved by the AO prior to installation and/or use. Failure to obtain approval for installation/use of tank heater/burners in any production storage tanks may result in a Written Order (WO), Incidence of Non-compliance (INC), assessments and/or potentially a Shut-In Order.
15. No below or partially below ground fluid storage/containment tanks or vessels are to be used without prior approval of the AO. Below or partially below ground fluid storage/containment tanks or vessels shall require systems for the prevention, containment, detection, and monitoring of any below ground leakage (e.g. secondary containment and leak detection/monitoring systems, etc.). A production facility layout depicting the proposed vessel construction and installation/location must be submitted for prior approval via APD or Sundry. As applicable, all subsurface vessels must comply with the Wyoming Storage Tank Act of 2007 (W.S. 35-1 1-14-29) and/or the Wyoming DEQ Underground Injection Control (UIC) Program.
16. No pipelines or flow-lines or related rights-of-way are approved with the APD. Well pipelines or flow-lines and related rights-of-way, including plans of development, must be submitted for approval via Sundry Notice or Right-of-Way Application (SF-299) as applicable, prior to construction.
17. The BLM AO may request and schedule a meeting with the Operator or Operators representative to discuss the APD and terms and COAs. Such meeting would be held in the BLM offices, within 30 days of the APD approval.
18. The BLM AO may request to schedule a meeting with the Operator or Operators representative (dirt contractor, construction contractor, surveyors, etc.) to discuss construction and related requirements. Such meetings would be held in the BLM office and in the field within 60-90 days prior to surface disturbance and construction. The BLM AO may require surveys and re-stacking of all project construction and disturbance prior to field inspection.

**OPERATIONS**

1. Upon request, Operator must be prepared to provide copies of applications for, and approved copies of, federal, state, and local operating permits.
2. All survey monuments found in the area of operations shall be protected. Survey monuments include, but are not limited to: General Land Office and BLM Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the Operator shall immediately report the incident, in writing, to the AO and the respective installing authority if known. Where General Land Office or BLM Right-of-way monuments or references are obliterated during operations, the Operator shall secure the services of a registered land surveyor or a BLM cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the "Manual of Surveying Instructions for the Survey of the Public Lands in the United States," latest edition. The Operator shall record such survey in the appropriate county and send a copy to the AO. If the Bureau cadastral surveyors or other federal surveyors are used to restore the disturbed survey monument, the Operator shall be responsible for the survey cost.
3. If any cultural values (sites, artifacts, human remains) are observed during operation of this lease/permit/right-of-way, they will be left intact and the AO notified. The AO will conduct an evaluation of the cultural values to establish appropriate mitigation, salvage or treatment. The Operator is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during construction, the Operator is to immediately stop work that might further disturb such materials, and contact the AO. Within seven (7) days after the Operator contacted the BLM, the AO will inform the Operator as to: whether the materials appear eligible for the National Register of Historic Places; the mitigation measures the Operator will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and, a time-frame for the AO to complete an expedited review under 36 CFR 800.11 to confirm, through the State Historic Preservation Officer, that the findings of the AO are correct and that mitigation is appropriate. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the Operator will then be allowed to resume construction.
4. The Operator will be responsible for the cost of any mitigation required by the AO. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the Operator will be allowed to resume operations.
5. If paleontological resources, either large or conspicuous, and/or of a significant scientific value are discovered during construction, the find will be reported to the AO immediately. Construction will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM-approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological values. Operations within 250 feet of such a discovery will not be resumed until written authorization to proceed is issued by the AO. The Operator will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operation.
6. The Operator will be responsible for informing all persons associated with this project that they will be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects or site. If archaeological, historical, or vertebrate fossil materials are discovered, the Operator shall suspend all operations that further disturb such materials and

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

immediately contact the AO. Operations shall not resume until written authorization to proceed is issued by the AO.

7. Within five (5) working days, the AO will evaluate the discovery and inform the Operator of actions that will be necessary to prevent loss of significant cultural or scientific values.
8. The Operator shall be responsible for the cost of any mitigation required by the AO. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, the Operator shall be allowed to resume operations.
9. If any dead or injured threatened, endangered, proposed, or candidate animal species is located during construction or operation, the U.S. Fish and Wildlife Service's Wyoming Field Office (307-772-2374), its law enforcement office (307-261 -6365), and the BLM Rawlins Field Office (307-328-4200) shall be notified within 24 hours. If any dead or injured sensitive species is located during construction or operation, the Rawlins Field Office shall also be notified within 24 hours.
10. If dead or injured raptors, big game, migratory birds, or unusual wildlife are observed on the project area, Operator personnel will contact the appropriate BLM and WGFD offices. Under no circumstances will dead or injured wildlife be approached or handled by Operator personnel.
11. Operators shall notify the BLM immediately if raptors are found nesting on or within 1,200 feet of project facilities and assist the BLM as necessary in erecting artificial nesting structures (ANSs) as appropriate. The use of ANSs will be considered as a last resort for raptor protection. If nest manipulation or a situation requiring a "taking" of a raptor nest becomes necessary, a special permit will be obtained from the Denver USDI-FWS Office, Permit Section and will be initiated with sufficient lead time to allow for development of mitigation. Required corresponding permits will be obtained from the WGFD in Cheyenne. Consultation and coordination with the USDI-FWS and WGFD will be conducted for all protection activities relating to raptors.
12. Operator and Operator's sub-contracted personnel shall not intentionally harm or harass wild horses, other wildlife, or domestic livestock.
13. ROW, mineral lease, mining claim, and permit holders shall monitor and control noxious and invasive weeds, according to an approved weed management plan, on project-disturbed areas and native areas infested as a direct result of the project. The control methods shall be in accordance with guidelines established by the EPA, BLM, state and local authorities. Prior to the use of pesticides, the Operator will obtain written approval from the AO - meaning an approved Pesticide Use Proposal form - showing the type and quantity of material(s) to be used, pest(s) to be controlled, method of application, etc.
14. Pesticide Use Proposals shall be submitted to and approved by the BLM AO—Weed Coordinator, prior to any application of any herbicide on the BLM lands. Pesticide Use Proposals will be tiered to the approved Reclamation Plan/Weed Management Plan.
15. Copies of daily Pesticide Application Records (required by the State of Wyoming) and Summary Herbicide Use Reports are due monthly to the BLM AO—Weed Coordinator.
16. The Operator shall be responsible for the prevention and suppression of fires on public lands caused by its employees, contractors, or its subcontractors. During conditions of extreme fire danger, surface use operations may be either limited or suspended in specific areas, or additional measures may be required by the AO. Should a fire occur, it shall be immediately reported to this office by calling 307-328-4200 and notifying the Fluid Minerals staff.
17. Emissions of particulate matter from well pad, road, and other facility construction, operation, and reclamation activities will be minimized by application of water or other dust suppressants. Dust inhibitors (surfacing materials, dust suppressants, and water) will be used as necessary on locations

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

that present a fugitive dust problem. The use of chemical dust suppressants on public surface will require prior approval from the AO.

18. If groundwater or permeable/porous subsoil or bedrock is encountered upon construction of the pad or pits, or upon drilling and completing shallow holes for surface conductor, rat/mouse holes, or water supply well, the Operator must immediately notify the AO's Representative before proceeding.
19. The Operator shall comply with the Hazardous Materials Management Plan/Summary in the RMP ROD (Appendix 32) and/or the appropriate EIS ROD, including requirements to transport, store, utilize, and dispose of hazardous substances. The Operator shall maintain a hazardous substances release contingency plan that shall include, among other things, provision to notify the AO in the event of any release of hazardous substances associated with project operations. Treatment chemicals may require additional storage and containment measures and facilities depending on chemical classification and hazard.
20. If a portable sewage treatment facility is moved onto location, the well/lease Operator shall provide the BLM AO a copy of the facility Operator's notification letter to the Wyoming Department of Environmental Quality. Facility operations shall comply with BLM requirements, including unauthorized discharge notification and reclamation of disturbed surfaces.
21. Only those hazardous wastes that qualify as **exempt**, under the Resource Conservation and Recovery Act (RCRA), Oil and Gas Exemption, may be disposed of in the reserve pit. Generally, oil or gas wastes are exempt if they:
  - a) have been sent down hole and then returned to the surface during oil/gas operations involving exploration, development, or production, or
  - b) have been generated during the removal of produced water or other contaminants from the oil/gas production stream. The term hazardous waste, as referred to above, is defined as a **listed** (40 CFR 261 -31 -33) or **characteristic** (40 CFR 261.20-24) hazardous waste under RCRA.
22. Any spilled or leaked oil, produced water or treatment chemicals must be reported in accordance with NTL- 3A and immediately cleaned up in accordance with BLM requirements. This includes clean-up and proper disposition of soils contaminated as a result of such spills/leaks. The Operator shall segregate, treat, and/or bio-remediate contaminated soil materials as authorized via Sundry Notice (Form 3 160-5) or dispose of contaminated soils at a permitted waste facility. Treatment chemicals may require additional storage and containment measures and facilities depending on chemical classification and hazard.
23. The Operator shall install an identification sign consistent with the requirements of 43 CFR 3 162.6 immediately upon completion of the well pad/location construction operations.
24. The Operator shall contain and remove all debris, unused equipment, and other waste materials not needed for production. Waste materials shall be disposed of at an approved disposal facility.
25. Upon APD expiration, it is the responsibility of the Applicant/Operator to see that all stakes, flagging, posts or other materials placed on the locations and/or access roads, pipelines and associated rights-of-way are removed. Operator must immediately cease all operations associated with preparing to drill the well and begin final reclamation activities of all APD related disturbance, pursuant to the approved APD Conditions of Approval and to be completed within 6 months of the APD expiration date.
26. Employee and contractor education will be conducted regarding wildlife laws. If violations are discovered on the project area, Operators will immediately notify the appropriate agency. Operators

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will implement policies designed to control off-site activities of personnel, that may result in littering or resource damage.

27. Company and contractor employees operating motorized equipment will undergo training describing the types of wildlife in the area, the circumstances under which collisions are likely to occur and the measures that can be employed to minimize collisions.

### CONSTRUCTION

1. All facilities on location that have the potential to leak/spill oil, glycol, methanol, produced water, condensate, or other fluids which may constitute a hazard to the environment, public health or safety (including, but not limited to, drain sumps, sludge holdings, and chemical containers), shall be within secondary containment, impervious to those fluids, exclusive of wildlife and livestock, with animal/bird escape capability, and able to contain a minimum of 110% of the volume of the largest storage vessel, respective to content, or 100% with at least one foot of freeboard, whichever is greater, so that any spill or leakage would not drain, infiltrate, or otherwise escape to ground water, surface water, or navigable waters before cleanup can be completed (within 72 hours).
2. Construction over and/or immediately adjacent to existing pipelines shall be coordinated, and in accordance with, the relevant pipeline companies' policy.
3. Fencing shall be installed around produced water, oil, and condensate tank batteries in order to help maintain the integrity of the surrounding containment structure and to prevent livestock and wildlife from entering the area in case of a leak or spill.
4. All open vent stack equipment shall be designed and constructed to prevent entry by birds and bats and to discourage perching.
5. The immediate repair/replacement (to BLM standards) of any range infrastructure breached, altered, or damaged by construction, drilling, or operation activities related to this APD shall be the responsibility of the Operator. All fence relocations will be in accordance with BLM approval.
6. Construction, maintenance, and reclamation operations with frozen material or during periods when the soil material is saturated is expressly prohibited. If equipment, including licensed highway vehicles, creates ruts in excess of four (4) inches deep, the soil shall be deemed too wet to adequately support maintenance and/or heavy equipment.
7. Accumulated snow present on the ground at the outset of construction, maintenance, or reclamation activities shall be removed before the soil is disturbed and piled downhill and/or downwind from the disturbed area. Equipment used for any non-construction snow removal operations will be equipped with 6" shoes to ensure blades do not remove topsoil or vegetation. Written approval must be obtained before snow removal related to a federal action but outside of designated disturbance areas is undertaken.
8. When blading/removing snow, drifts/berms shall be constructed with a gap of 35 yards every 1/4 mile, to allow unobstructed movement of wildlife, livestock and human activities.
9. If right-of-way fencing is required, it will be kept to a minimum and the fences will meet the BLM/WGFD approval for facilitating wildlife movement. Wildlife-proof fencing will be used only to enclose areas that are potentially hazardous to wildlife species or reclaimed areas where it is determined that wildlife species are impeding successful vegetation establishment.
10. Snow fences, if used, will be limited to segments of one-quarter mile or less. In addition, escape openings will be provided along roads in big game crucial winter ranges, as designated by the BLM, to facilitate exit of big game animals from snowplowed roads.

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11. Clearly remove, segregate, and delineate from all other spoils, all available topsoil from constructed locations and surface disturbances including areas of cut and fill. Stockpile and clearly identify topsoils at the site for use in reclamation on all areas of surface disturbance (well pads/locations, roads, pipelines, etc.).
12. Plugs or embankments providing wildlife with access out of and across open pipeline trenches shall be installed, at minimum, every 1,320 linear feet along open pipeline trenches.
13. No construction and/or reclamation shall block or change the natural course of any drainage, nor shall topsoil, waste, or fill material be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways. The lower edge of soil or other material stockpiles will be located outside active floodplains. All spoils will be placed where they can be retrieved without creating additional surface disturbance and where they do not impede and/or contribute sediment to watershed and drainage flows. The Operator shall also reconstruct and stabilize stream channels, drainages, and ephemeral draws to exhibit similar hydrologic characteristics that were found in stable, naturally occurring and functioning systems.
14. Drainage and run-on/runoff shall be diverted away from all new construction naturally or through the use of diversion ditches/berms and/or soil berms or stockpiles. All drainage structures shall approximate topographic contour lines, have a grade no greater than 0.5 – 1 percent, and shall release water onto natural undisturbed ground without causing additional and/or accelerated erosion. Drainage structures shall not discharge directly into/onto natural drainages/channels, and/or use riprap or other armoring to protect from erosion (BLM Manual 9113). Water-bars, waddles, hay bales, and/or silt fences shall be used as needed to reduce surface runoff velocity and promote upland sediment deposition, thus reducing drainage/channel sedimentation and erosion.
15. Silt fences, if needed, would be installed after topsoil removal and before pad leveling begins and must remain in place until interim reclamation is complete and there is adequate vegetation present to stabilize the soil. Silt fences would be constructed in locations where surface erosion is evident or potential for surface erosion exists such as areas of steep slopes or highly erosive soils. Fences would be installed at the inside edge of disturbance.
16. Silt fences would be constructed using metal posts that are at least 5 feet long with at least 2 feet in the ground (3 feet above ground) with 8 feet spacing if a wire re-enforcement backing is used or 6 feet spacing if no wire backing is used. The fabric is to be toed into the ground at the base of the fence a minimum of 8 inches deep and an 18 inch overlap is required when splicing two fences together. The fabric is to be installed on the uphill side of the metal posts and attached to the posts at least every 6 inches along the length of the post. Silt fences are to be inspected at least once a month or 48 hours after a rain storm event. If holes in the fence or undercutting of the fence are found, repair is required within 48 hours of discovery. When silt accumulates to a height equal to two-thirds the height of the fabric, the silt is to be cleaned out and deposited on the excess spoils pile.
17. Sediment fences, straw wattles, erosion mats and/or hay bales should be used to minimize erosion and sediment transport on disturbance area.
18. If temporary surface pipelines, as authorized by the AO, are used to transport water, they shall be placed/removed when the ground surface is dry. Surface blading prior to line placement is prohibited. The pipelines must be removed within 30 days after well completion (or determination of inactivity).
19. Construction control stakes shall be placed as necessary to ensure construction of the well pad, topsoil stockpile, spoil pile, and outer limits of the area to be disturbed in accordance with the specifications outlined in the APD. The Operator shall assume full responsibility for protecting all stakes and offsetting any additional stakes or grades which may be necessary.



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20. All production facilities including but not limited to tanks, separators, dehydrators, meters, etc. would be co-located on nearby producing well locations, in accordance with an approved Sundry Notice of Intent for construction. All wells, above-ground structures, production equipment, tanks, transformers and insulators not subject to coloring requirements for safety would be painted the color of “non reflective Shale Green”.
21. To protect the identified ferruginous hawk nests, Greater Sage-grouse leks and wintering big game habitat, the project proponent will install housing and/or muffler(s) around equipment that exceeds 55 dBA (ES-7, 4-69, 4-157 AR EIS)
22. Cathodic protection wells would be drilled on the existing well pad, placed so as not to interfere with re-contouring of cut and fill slopes during interim reclamation, designed and constructed to prevent commingling and contamination of water aquifers. The AO would be notified of any water flows at surface and the problem would be resolved promptly.
23. All stacks, exhauster, or vent pipes shall have anti perch cones and vent covers to prevent bat or small bird entry and entrapment.

### ROADS

1. All access roads and drainage control structures, whether existing or newly constructed, shall be both constructed to resource road standards and regularly maintained in a safe and usable condition as outlined in BLM Manual, Section 9113. A regular maintenance program may include, but is not limited to, blading, ditching, culvert installation, dust control, and gravel surfacing or other activities as specified by the AO. The Lessee and/or Operator shall enter into a maintenance agreement with all other "authorized users" of the common access road(s) to the well site. The costs of road maintenance in dollars, equipment, materials, labor, and other related expenses shall be shared proportionally among the "authorized users." Upon request, the AO shall be provided copies of any maintenance agreement or agreements.
2. Access roads would be constructed to the BLM Road Standards in such manner as to minimize cuts and fills and minimize erosion and sedimentation and maximize reclamation, as determined during the onsite.
3. **Engineered Roads** and/or **culverts** shall be designed in accordance with the Engineered Road Requirements, with four copies of the following information submitted to the BLM project NRS for approval, prior to construction.
  - a. Plan, profile and typical cross section.
  - b. Centerline stakes shall be placed in the field, with culvert locations marked on the centerline, for the BLM review before final design approval. In addition, slope stakes shall be placed at the top of the cut and the bottom of the fill for those portions of the road that are engineered. All roadways cuts and fills shall be designed to balance from earthwork within the ROW, or an approved borrow source.
  - c. Perform a “hydrologic analysis” to design culverts sized to pass a 25-year precipitation event with no head developed at the culvert inlet.
  - d. The submitted plans must be signed/certified by a professional engineer and will include any special notes for construction and cut/fill balance notes.
4. All Operators and Operator's representative vehicles are restricted to authorized travel routes only and shall not use any other access route, e.g.; two-track roads, trails, and pipeline rights-of-way to access the drill/ell pad and any ancillary facilities.
5. Two-track roads shall not be cut-off as a direct result of construction, maintenance, or reclamation of the well access road or associated well facilities, unless authorized by the BLM.

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6. Prior to construction, road(s) shall be surveyed and staked with construction control stakes set continuously along the centerline at maximum 100-foot intervals (less where needed to be inter-visible) and at all tangent and curve control points, fence or utility crossings, and culverts. In addition to centerline stakes, slope stakes shall be placed at the top of the cut and the bottom of the fill for those portions of the road that are engineered.
7. Before proposed road construction activities begin, the topsoil must be bladed to the side of the road and stockpiled. The topsoil stockpile shall be contoured so as to prevent water ponding or flow concentration. Once the borrow ditch and the cut slopes are constructed, cleared vegetative material and topsoil that is windrowed shall be spread back onto the cut/fill slopes of the road, removing any windrows or berms remaining at the edge of the road.
8. The minimum travel-way width of the immediate access road will be 14 feet with turnouts at least 10 feet in width. No structure will be allowed to narrow the road top. The inside slope will be 4: 1. The bottom of the ditch will be a smooth V with no vertical cut in the bottom. The outside slope will be 2:1 or flatter. After the road is crowned and ditched with a .03-.05 ft/ft crown, the topsoil and windrowed vegetative material shall be pulled back down on the cut slope so there is no berm left at the top of the cut slope. Turnouts will be spaced at a maximum distance of 1000 feet and will be intervisible. If the access road crosses a floodplain, the ditch shall be flat-bottomed so as to provide material to raise the road, unless otherwise approved by the AO.
9. If soils along the access road route are dry during road construction, use, and/or maintenance, fresh water shall be applied to the road surface to facilitate soil compaction and minimize soil loss as a result of wind erosion.
10. Construction and surfacing of the new access road shall be complete prior to moving drilling equipment onto the well pad and the presence of heavy vehicular traffic. Compact the top foot of sub-grade in even six (6) to eight (8) inch lifts to established standards, adding water as needed for compaction. Surface with an appropriate grade of gravel to a minimum depth of four (compacted) inches.
11. All cattle guards shall be designed and maintained consistent with BLM standards and shall be a minimum of 16 feet wide and 8 feet long; set on either timber, pre-cast concrete, or cast-in-place concrete bases at right angles to the roadway. They shall have drop-down wings and an adjacent 16 foot wide tubular bypass gate; not narrow the road surface; and have fence and end panels on either side constructed using 3 posts with “H” braces.
12. All culverts shall be a minimum of 18 inches in diameter. Culverts shall have a minimum of 12" of fill or 1/2 the pipe diameter, whichever is greater, placed on top of the culvert, and shall be of length sufficient to allow at least 12" of culvert to extend beyond the toe of any slope. The inlet and outlet shall be set on grade. No rocks shall be used in the bed material and no rocks greater than 2" in diameter will be immediately adjacent to the culvert. The entire length of pipe shall be bedded on native material before backfilling, which shall be completed using unfrozen material and rocks no larger than two inches in diameter; compact the backfill evenly in 6" lifts on both sides of the culvert. A permanent marker shall be installed at both ends of the culvert to help prevent traffic from damaging the culvert. Additional culverts will be placed in the new access road as the need arises or as directed by the AO.
13. Wing-ditches shall be staked and constructed at a slope of .5 to 1.0 percent down slope unless otherwise approved by the AO. All wing/drainage ditches and culverts shall be kept clear and free flowing, and shall also be maintained in accordance with the original construction standards. Drainage structures shall not discharge directly into/onto natural drainages/channels, and/or use riprap or other armoring to protect from erosion (BLM Manual 9113).

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14. Low water crossings shall be constructed perpendicular to the channel and at original channel elevation in a manner that will not block or restrict existing channel flow. Excavated material shall be stockpiled for use in reclamation of the crossings.

### PITS

1. All oil and gas pits that could contain fracture/stimulation fluids, recycled pit fluids, or produced water, except those only containing fresh-water based constituents, are required to be lined with an impermeable (12 mil minimum with a permeability less than or equal to  $1 \times 10^{-7}$  cm/sec) liner. The liners shall be physically and chemically compatible with all substances which it may contact and shall be of sufficient strength and thickness to withstand normal installation and use, and installed so that it will not leak. The liner shall be installed over a smooth sub-grade, matting, or fill materials (e.g. sifted dirt, sand, or bentonite) free of pockets, loose rocks, and other objects that could damage the liner.
2. The only fluids/waste materials which are authorized to go into reserve pits are RCRA-exempt exploration and production wastes. Any evidence of RCRA non-exempt wastes being put into the reserve pit may result in the BLM AO requiring specific testing and closure requirements.
3. All pits are required to maintain a minimum of 2 feet of freeboard between the liquid level and the top of the liner. If operations cause fluid levels in pits to rise above the required freeboard, immediate notification shall be provided to the AO with concurrent steps taken to cease the introduction of additional fluids, until alternative containment methods can be approved.
4. Flaring of gas into the reserve or completion pits will not be allowed without prior approval from the AO. Flaring into lined pits is prohibited.
5. All pits shall be kept free of trash, debris, solid wastes, and other unauthorized waste materials including oil and liquid hydrocarbons.
6. For the protection of livestock and wildlife, all pits and open cellars shall be fenced on all sides, with corner bracing, immediately upon construction. Reserve, flare, completion, and production pits shall be adequately fenced during and after drilling operations until pits are reclaimed so as to effectively keep out wildlife and livestock. Operator shall, within ten (10) days of discovery, remove any floating hydrocarbons from pit surface. Approved netting (mesh diameter no larger than one inch) is required over any pit that contains or is identified as containing hydrocarbons or hazardous substances (per RCRA 40 CFR Part 26.1 or CERCLA Section 101 (E)).
7. Pits shall be dried, backfilled, and closed within six (6) months from well completion (total depth) or well plugging. Pits must be void of all free fluids prior to backfilling. Pit trenching or squeezing is prohibited. Pits may be dewatered/dried in the following manner: natural evaporation, mechanical aeration, chemical and mechanical solidification (e.g. with fly ash, cement kiln dust, etc.) and/or hauled to an approved DEQ disposal site. The installation/operation of any sprinklers, misters, aerators, pumps, hoses, and related equipment shall ensure that water spray or mist does not drift outside of the pit. All other dewatering/drying, removal or disposal methods not listed in the APD and or COAs shall have prior written approval from the AO.
8. Pits, once dry, shall be backfilled and compacted with a minimum cover of five (5) feet of soil, void of any topsoil, vegetation, large stones, rocks or foreign objects. The pit area shall be mounded to allow for settling and to promote positive surface drainage away from the pit. Before backfilling synthetically lined reserve pits, those liner portions remaining above the "mud line" shall be cut off as close to the top of the mud surface as possible and disposed of at an approved solid waste disposal facility. The pit bottom and remaining liner shall not be trenched, cut, punctured, or perforated.

## **FLUIDS**

1. All storage, removal and disposal of produced water must be in accordance with and comply with Onshore Oil and Gas Order No. 7. Produced water must be disposed of at a permitted off-site commercial disposal facility, unless approved otherwise by the BLM AO. The onsite storage/disposal of produced water, in open pits, tin horns, sumps, etc., is not authorized except as follows: 1) produced water from the well subsequent to drilling may be disposed of in the approved well site reserve pit (for up to 90 days), and/or 2) used for well drilling or completion, upon prior written approval from the AO via approved APD or Sundry. Produced water may be transported and used for drilling/completion operations from approved fee, state, or federal wells/leases to federal wells/leases within the developed field/unit and/or EIS area, subject to WOGCC and BLM approval.
2. Pit drilling fluids may be transferred from a reserve pit at an approved federal well location to a lined reserve pit at another approved federal well location, for the purpose of drilling the well. Transfer/reuse shall only be permitted when transfer is by a lease Operator from one or more pits to another pit or pits on the Operator's federal lease/unit or adjacent federal lease. Unless approved by this APD, the transfer and reuse of pit drilling fluids shall require prior written approval from the AO, via a Sundry Notice (Form 3160-5).
3. The AO may authorize the use of produced water or reuse of pit drilling fluids for drilling when: 1) surface casing has been set with fresh water through **any** and all possible fresh water zones, 2) use is for drilling/completion only, and 3) the receiving pit is lined.
4. Pit fluids may be transferred by a lease Operator from one or more pits to another (lined) pit or pits on the Operator's federal lease/unit or adjacent federal lease, for the purpose of fluid consolidation and mechanical/chemical drying and disposal. The 6-month pit closure requirement shall apply. Unless approved by this APD, the transfer of pit fluids for consolidation/disposal shall require prior written approval from the AO, via a Sundry Notice (Form 3160-5).
5. Initial Operator requests for the transport and use/reuse of produced water or pit drilling fluids or the transfer/consolidation of pit fluids shall include: 1) the potential locations/leases in which fluids are to be transferred to and from, and 2) the potential quantity to be moved. Requests shall be submitted for prior written approval from the AO via APD or Sundry Notice. Upon completion of transport, use/reuse or consolidation, the specific information on leases, units or locations and quantities transferred shall be submitted to the AO, via Sundry Subsequent Report. Transportation of fluids shall be along approved haul routes and authorized right-of-ways. Temporary surface pipelines may be authorized by the AO for the transfer of fresh water only, and NOT for produced water or pit fluids.
6. Drilling water sources/supplies or any changes to drilling water sources/supplies, the fate of drilling/completion fluids, routes and means of fluid transportation/disposal, and location or method of produced water disposal requires prior written approval from the AO via approved APD, Sundry Notice or Right-of-way (ROW) as applicable. The drilling of water wells on federal lands shall require prior BLM approval via APD, Sundry, or ROW as applicable, in addition to State Engineer Office (SEO) approval.

## **RECLAMATION**

1. A reclamation plan shall be submitted with each APD. The reclamation plan will address short-term stabilization to facilitate long-term reclamation. The reclamation plan is considered complete when all the reclamation requirements described in the BLM Reclamation Policy and the Rawlins RMP have been addressed, the techniques to meet the reclamation requirements are described in detail, and the BLM concurs with the reclamation plan. Surface disturbance will not be allowed until the reclamation plan is submitted, complete and approved by the BLM Authorized Officer.
2. The Reclamation Plan shall include:

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- a. Prior to any surface disturbing activities, vegetation inventories shall be conducted on each ecological site and they shall be mapped. At a minimum, vegetation inventories shall be conducted for basal cover and vegetative life form type and frequency (including individual invasive and noxious weed species) and include at least one photograph of each transect. An inventory of 100 to 400 points (depending on the amount and type of vegetative cover) using transects is highly recommended. The inventory method shall be included within the Reclamation Plan for approval.
  - b. Prior to the completion of interim and final reclamation, the Operator shall sample and test soils for suitable surface and subsurface physical and chemical properties. At a minimum the soil shall be tested for texture, electrical conductivity, reactivity, pH and photographed. At least one photograph at each soil pit is required which also shows the vegetation community. These tests are to be used by the Operator to evaluate the suitability of the soils or seedbed for seed germination and potential for vegetative success under the approved reclamation plan.
  - c. Prior to the completion of interim and final reclamation and seeding, the Operator shall submit to the BLM AO, via Sundry Subsequent Report (Form 3160-5), the results of all vegetative and soils surveys and tests. Should pre-disturbance and interim/final reclamation test results differ to the extent that the soil requires amendment(s) or the proposed seed mix requires modification to achieve the desired ecological and plant community, the Operator shall submit a revised reclamation plan via Sundry Notice of Intent (NOI) (Form 3160-5). The Sundry NOI shall outline any proposed soil amendments, treatments, additives or modifications, seed mix changes and other necessary revisions to the reclamation plan.
  - d. Provisions to meet Standards and Guidelines for Healthy Rangelands (43 CFR 4180.1) and obtaining desired plant communities:  
[http://www.blm.gov/wy/st/en/field\\_offices/Rawlins/range.html](http://www.blm.gov/wy/st/en/field_offices/Rawlins/range.html)
  - e. Mitigation for direct, indirect and cumulative livestock forage losses and impacts to livestock grazing (including impacts to livestock operations and production performance). This could include reclamation that would replace forage losses from surface disturbing activities, avoiding trailing routes and livestock gathering areas and seasonal restrictions (such as during lambing and calving in specific areas).
3. The annual monitoring report shall be submitted by March 1 of each year. This report shall include reclamation and restoration efforts, including seeding/re-vegetation, invasive plant treatment/control, and soil stabilization and erosion prevention. The report shall be in accordance and consistent with the BLM and/or RFO Reclamation Policy, RMP (ROD) and Appendix 36, and the field/project level EA/EIS, as applicable. The yearly Operator report would include surface disturbance and reclamation data for the previous calendar year, utilizing the BLM RFO Disturbance (As-Built) Reclamation Database. The RFO surface disturbance and reclamation database, as well as information on the database and submission of the data, will be available at:  
[http://www.blm.gov/wy/st/en/field\\_offices/Rawlins/oil\\_and\\_gas.html](http://www.blm.gov/wy/st/en/field_offices/Rawlins/oil_and_gas.html), or by contacting the RFO, Minerals and Lands, Supervisory Natural Resource Specialist/Physical Scientist at 307-328-4200 for further information.
  4. Reclamation plans and procedures, including those for seeding/re-vegetation and weed control, shall be modified and revised as necessary in order to achieve desired results and requirements. .
  5. Reclamation earthwork for interim and/or final reclamation shall be completed within six months of well completion or well plugging (weather permitting) and shall be consistent with the approved reclamation plan. Reclamation earthwork consists of:
    - a. Backfilling pits,
    - b. Re-contouring and stabilizing the well site, access road, cut/fill slopes, drainage channels, utility

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- and pipeline corridors and all other disturbed areas, to approximately the original contour, shape, function and configuration that existed before construction (any compacted backfilling activities would ensure proper spoils placement, settling and stabilization,
- c. Surface ripping, prior to topsoil placement, to a depth of 18-24 inches deep on 18-24 inch centers to reduce compaction,
  - d. Final grading and replacement of topsoil,
  - e. Surface-roughening and other techniques such as snow fencing to increase soil moisture retention and reduce compaction. Surface soil material can be pitted or roughened (not exceeding the applied topsoil depth) such that the entire reclamation area shall be uniformly covered with depressions constructed perpendicular to the natural flow of water and/or prevailing wind, and
  - f. Seeding.
6. Interim or final reclamation of all surface disturbed areas shall commence and be completed within one year of initial disturbance unless needed for well production operations, or otherwise approved by the AO. Interim reclamation for those areas not needed for production operations, including unnecessary access roads and pipeline right(s)-of-way, shall commence and be completed within six months of well completion. Stockpiled soils shall be distributed on disturbed areas and the production pad shall be as small as possible to allow for safe and prudent production operations. Some topsoil may be reserved for final reclamation.
  7. Any topsoil to be stockpiled for longer than one year shall be spread in layers not to exceed two feet maximum thickness, including topsoil underneath the pile and appropriately identified/signed as topsoil. These soil stockpiles shall be seeded with a prescribed seed mixture or sterile cover crop (included within the approved reclamation plan) and covered with mulch to reduce erosion and discourage weed invasion.
  8. Temporary fencing of the reclaimed well/facilities locations for the first two growing seasons after either interim or final seeding may be required to exclude livestock and wildlife and to help ensure better re-vegetation success.
  9. Any subsequent re-disturbance of reclamation shall be reclaimed within six months by the same means described in the approved reclamation plan.
  10. A Notice of Intent to Abandon (Form 3160-5) must be submitted and approved prior to any well abandonment activities. A joint inspection of the disturbed areas may be required and attended by the BLM and the Operator (or Operator's Designee), the primary purpose of which is to review and agree to the existing (or a new) abandonment and/or final reclamation plan. Earthwork must commence and be completed within six months from the date of plugging and abandonment and seeding no later than the next immediate growing season upon the completion of earthwork. All reclamation should be accomplished as soon as possible after the disturbance occurs, with efforts continuing until a satisfactory revegetation cover is established and the site is stabilized (three to five years) (RMP ROD Appendix 13-8).
  11. The Operator shall submit a Final Abandonment Notice (FAN), using Form 3160-5, to the AO when adequate reclamation of surface-disturbed areas has been completed. This FAN indicates that the Operator believes the location is considered ready for final inspection, with adequate vegetation cover and species diversity. Upon receipt of the FAN, the BLM will conduct a field inspection prior to releasing the bond liability for this location.
  12. Re-vegetation shall consist of species occurring in the surrounding natural vegetation and/or included in the approved seed mix as deemed desirable by the BLM or private surface owner in

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review and approval of the reclamation plan. Inter-seeding, secondary seeding, or staggered seeding may be required to accomplish re-vegetation objectives. The seed mixture(s) shall be planted in the amounts specified in pounds of pure live seed (PLS)/acre. There shall be no primary or secondary noxious weed seed in the seed mixture. Seed should be tested and the viability testing of seed would be done in accordance with State law(s) and within nine months prior to purchase. Commercial seed would be either certified or registered seed. The seed mixture container would be tagged in accordance with State law(s) and available for inspection by the AO. Since seeds are of different sizes and require different planting depths, the Operator would use the appropriate equipment to ensure that the seed mixture is correctly and uniformly planted over the disturbed area. Seed would be broadcast if drilling is not possible. When broadcasting the seed, the pounds per acre are to be doubled. The seeding would be repeated until a satisfactory stand is established as determined by the AO

13. All practicable measures would be utilized to minimize erosion and stabilize disturbed soils on or adjacent to the disturbed and reclaimed area. There would be no evidence of mass-wasting, head-cutting, large rills, gullies, down cutting or overall slope instability. Should the use or storage of hay, straw, or mulch be necessary, the Operator is required to use certified weed-free hay, straw and mulch on the BLM lands.
14. Evaluation of growth and success shall be conducted as per RMP ROD (Appendix 36). If the treatment area is found, through Operator site-specific monitoring data, to be successfully reclaimed, Operator monitoring to confirm reclamation success shall continue for at least five growing seasons. The site shall also comply with additional management needs, including control of weed infestations. Success criteria as defined by the RMP is: criteria based on pre-disturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition (which the Operator will do prior to disturbance) or eighty percent of pre-disturbance ground cover, ninety percent dominant species, no noxious weeds, and erosion features equal to or less than surrounding area.

### DRILLING

**No production from the wells drilled on this well pad location should start production UNTIL Sundry Notices granting variances from Onshore Orders 4 and 5 as related to commingling and allocations are approved.**

The drilling operations for this well shall be conducted in accordance with the Onshore Oil and Gas Order No. 2 as provided for in 43 CFR 3164.1. This includes the well control equipment and its testing, the mud system and associated equipment, and the casing and cementing. Any deviation from this approved drill plan pursuant to these conditions of approval requires prior approval of the petroleum engineer of the Rawlins Field Office.

### BOPE

1. All BOPE shall meet or exceed the requirements of a **5M** system as set forth in Onshore Oil and Gas Order No. 2.
2. **All choke lines from the drilling spool forward, shall be straight steel lines flanged at both ends, unless turns use tee blocks or are targeted with running tees and shall be anchored to prevent whip and reduce vibration.** All choke lines shall have the same pressure rating as the BOP stack and choke manifold. The diameter of this line shall be a minimum of 2 inches for a 2M BOP system and a minimum of 3 inches for a 3M and greater BOP system.
3. **When an Operator chooses to use flexible lines for choke operations equipment they must:**

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

- a. Make a request for approval in advance of its use. The request must provide documentation showing the flexible hose was design specifically for the purposes of choke operations.
- b. The request for approval must include the Manufacturer's technical specifications for the flexible hose(s) under consideration. Specifications must include as a minimum:
  - 1) The smallest internal diameter of any section or part of the flexible hose assembly.
  - 2) The rated working pressure and temperature of the flexible hose assembly.
  - 3) The Minimum Bend Radius (MBR) at rated working pressure.
- c. Manufacturer's technical specification must be kept on site and available for inspection at all times. Flexible hoses once approved and installed must match the original manufacturer's technical specifications regarding all stated dimensions and ratings. Flexible hoses which have been altered, repaired, or remanufactured in any way from their original specification without approval or certification from the original manufacturer will not be allowed. **If the specifications are not available on site or the hose does not match the specifications, operations may be shut down until correction is accomplished.**
- d. Each flexible hose must be marked/stamped by the manufacturer with the following information clearly legible and accessible on the steel sections of each end of the flexible hose (end fittings, couplers, flanges, stiffeners, etc.):
  - 1) Name or identification of the manufacturer.
  - 2) Serial number.
  - 3) The internal diameter of the flexible hose assembly.
  - 4) The rated working pressure of the flexible hose assembly.
- e. Flexible hoses must be firmly anchored to prevent excessive whip or vibration. Anchors must be constructed in a manner capable of withstanding whip and vibration given the rated working pressure and flow rates of the well control equipment.
  - 1) Anchors must be attached to the flexible portion of the hose and not to the "metal end assemblies" (e.g. hubs, flanges, stiffeners, etc.)
  - 2) Flexible hoses of twenty (20) feet or more in total length must be supported in order to keep the hose fairly level and secure from excessive movement. Leveling support locations must also be anchored adequately to withstand whip and vibration under rated working pressures and rated flowing conditions.
  - 3) Each and every bend in the flexible hoses exceeding 45' must be anchored.
- f. Use, operation, and maintenance of flexible hoses will comply fully with the manufacturer's specifications unless otherwise specified by the AO.
- g. Minimum diameters for choke lines will comply with the requirements of Onshore Order No. 2, III.A.2.a.
- h. Flexible hose end connections will meet all minimum requirements of Onshore Order No. 2. For example 3M systems and above require "All BOPE connections subjected to well pressure shall be flanged, welded, or clamped".
- i. Flexible hoses used in Hydrogen Sulfide (H<sub>2</sub>S) operations must provide proof the hose is approved by the manufacturer for use in this type of environment.
- j. Flexible hoses which are deformed (kinks, flattened areas, dents, significant surface abrasions or wear, permanent bends, etc) from the manufacturer's design and operational specification will be replaced upon discovery.
- k. It is the intent of the BLM in Wyoming to implement the Reaffirmed 2001 API publication (SPEC 16C) standard for Flexible choke hoses as a uniform requirement within the next three



## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

years. Operators during routine maintenance or replacement of these hoses may want to consider hoses which can meet the **API** (SPEC 16C) standard.

4. A Form 3160-5 (subsequent Report Sundry Notice) shall be submitted to the AO's representative within five (5) working days following the test reporting the test results. The results reported will be a copy of the third party BOP test report including time and pressure charts, accumulator tests, notes/results made while performing the test, and recordation of any repair of BOP equipment made.

### Casing and Cementing

1. For all **5M** BOPE systems or greater, a pressure integrity test of each casing shoe shall be performed. The formation at the casing shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.
2. Pea Gravel or other material shall not be used to fill up around the surface casing in the event cement fall back occurs.
3. A Form 3160-5 (Subsequent Report Sundry Notice), along with a copy of the service company's materials ticket and job log shall be submitted to this office within 5 working days following the running and cementing of all casing strings.
4. Any change in the casing and cement design will be approved by the AO prior to the running of the casing string and/or cementing.
5. No freshly hard-banded rough carbide pipe/collars will be rotated in the surface casing.

### Mud Program

1. Drilling of the surface casing will occur with fresh water only.
2. If a temporary surface pipeline is used to transport drilling water, the pipeline shall be laid and removed when the ground surface is dry so as to minimize surface disturbance. No blading or other alteration of the ground surface shall be allowed.

### Directional Drilling

1. Per 43 CFR 3160.0-9 and 3162.4-2 for all wells drilled directionally, as Operator, you will be required to file with the Well Completion Report, Form 3160-4, a Certified Directional Survey.
2. This Certified Directional Survey, required by 1) above, will include a Directional Survey Certification Form as certified by the directional contractor and the Operator Bottom Hole Location Certification Form as specified in the Wyoming Oil & Gas Conservation Commission (WOGCC) letter to All Wyoming Oil and Gas Operators dated October 15, 2009, as may be amended from time to time.
3. The requirements for a complete Certified Directional Survey are the same as found in the attachment to WOGCC letter to All Wyoming Oil and Gas Operators dated October 15, 2009, as may be amended from time to time.

### Other

1. In the event down hole operations threaten to or cause fluid levels in the reserve pit to encroach on the required 2-foot freeboard, immediate notification shall be provided to the AO with concurrent steps taken to minimize the introduction of additional fluids until alternative containment methods can be approved.
2. Rat and mouse holes (or any sub-grade excavations for drilling operations) shall be filled and compacted, with appropriate native materials, immediately upon release of the drilling rig from the location.

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

3. Any permanent plug placed in the well during drilling and/or completion operations must have **prior approval** of the AO.
4. As provided in NTL4A, gas produced from this well may not be vented or flared beyond an initial test period, 30 days or 50 MMcf, whichever first occurs, without approval of the AO.
5. Drill Stem Tests shall meet or exceed the requirements set forth in Onshore Oil and Gas Order No. 2.
6. All usable water, hydrocarbon and other mineral zones must be protected.
7. Pursuant to Onshore Oil and Gas Order No. 2.III.B.1.e. and the Rules and Regulations of the Wyoming Oil and Gas Conservation Commission (Chapter 3, Section 22.(a) (i)), the **Operator shall report all fresh water flows encountered while drilling to the AO (Petroleum Engineer) prior to the running the next string of casing. The** reported information shall include a) well name, number and location, b) the date the water flow was encountered, c) depth at which the water flow was encountered and d) estimated water flow rate into the well bore. The Operator shall file a Form 3 160-5 (Subsequent Report Sundry Notice) of this same information within 30 days of releasing the drilling rig.
8. Open hole logs consisting of deep, medium and shallow resistivity curves, a porosity log and gamma-ray and SP curves shall be run at TD to at least 50' above any zone which may be considered to be productive of hydrocarbons.
9. **Completion Report:** In accordance with 43 CFR 3160, Form 3160-4 (Well Completion or Recompletion Report and Log) must be submitted to the AO within 30 days after completion of the well or after completion of operations being performed, whether the well is completed as a dry hole or as a producer. Copies of all open hole and cased hole logs, core descriptions, core analyses, well test data, geologic summaries, sample descriptions, daily drilling reports, daily completion reports, formation test reports, stimulation reports, directional survey (if applicable), and all other surveys or data obtained and compiled during the drilling, completion, and/or work over operations, shall be included with Form 3160-4. **Copies of all logs, as noted above, shall be submitted to this office on a compact disc in a ".las" digital file format and shall have a precision readout increment of 0.5 feet. Any Mud Log copy submitted to this office shall be in a ".tif" format.**
10. **Well Abandonment:** In the event abandonment of the hole is desired, oral approval may be granted by the AO (Petroleum Engineer), but must be followed within 5 days with a Form 3160-5 (**Sundry Notice of Intent to Abandon**) which will give the complete plan of operation that will be utilized in the plugging. Unless the plugging is to take place immediately upon receipt of the oral approval, the AO (Petroleum Engineer) must be notified at least 24 hours in advance of the plugging of the well in order that this office can witness the plugging operation. Failure to obtain approval prior to commencement of abandonment operations shall result in immediate assessment under 43 CFR 3163.1 (b)(3). The following will occur if the well is abandoned:
  - a. In order to reduce the visual impact of the reclaimed well site, the casing shall be cut-off at the base of the cellar or 3 feet below the final restored ground level (whichever is deeper). The well bore shall then be covered with a metal plate at least 1/4 inch thick and welded in place. On the metal plate shall the following information be permanently inscribed: i) company/Operator name, ii) lease number, iii) well name/number, and iv) well location description to the nearest quarter-quarter section (40 acres).
  - b. A GPS re-verification and certification of the abandoned well location shall be made for coordinates of degrees latitude and longitude with accuracy to the sixth decimal place. This well location re-verification shall be noted on the Subsequent Report Sundry Notice of Abandonment.

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

- c. A temporary steel fence post with an attached placard indicating the well name/number and location shall be placed adjacent to the well bore until final well site reclamation has been performed and the Final Abandonment Notice (FAN) is approved.
- d. Within 30 days following completion of the well abandonment, you shall file with this office, subsequent Report of Abandonment (Form 3 160-5). To be included with this report is where the plugs were placed, volumes of cement used, well bore schematic as plugged, along with copies of all service company job log and service tickets.

**The Operator shall promptly plug and abandon each newly completed, re-completed or producing well which is not capable of producing in paying quantities.** No well may be temporarily abandoned for more than 30 days without prior approval of the AO. When justified by the Operator, the AO may authorize additional delays, no one of which may exceed an additional 12 months. Upon removal of drilling or producing equipment from the site of a well which is to be permanently abandoned, the surface of the lands disturbed shall be reclaimed in accordance with a plan first approved or prescribed by the AO or per the reclamation conditions of approval stated herein.

### SITE SPECIFIC

Additional COAs are usually included with the above to reflect requirements that apply to local conditions, such as seasonal wildlife restrictions, special surveys, specific constraints on road or well pad location or construction, and/or additional reclamation requirements.

### RIGHT-OF-WAY TERMS AND CONDITIONS

In the process of acquiring permission to obtain a right-of-way, users submit a Form SF-299 to the BLM Field Office that manages the public lands where their proposed project is located. Included with the Form SF-299 are:

- a Plan of Development that contains a description of the proposed project (map, location, details of construction, and methods for containment and disposal of waste material), geologic data, expected hazards, and proposed mitigation measures to address such hazards; and
- a reclamation plan, which includes a weed management plan.

When the BLM has completed the necessary environmental and technical review of the proposal, the BLM may approve the right-of-way as submitted or, more typically, approve the right-of-way subject to terms and conditions (T&C) on a grant.

T&C are attached to an approved grant to ensure environmental protection, safety, and/or conservation of the mineral resource. They arise from a variety of controlling authorities such as Title V of the Federal Land Policy and Management Act of October 21, 1976 (FLPMA), Section 28 of the Mineral Leasing Act of 1920 (MLA), the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA). The T&C attached to a grant can be general in nature or site-specific, and thus will vary from one BLM Field Office to another. Often the Field Office RMP provides either a listing of potential T&C or the BMPs that might guide development of site-specific T&C in that area. They can address topics as wide-ranging as protection of wildlife habitat or archeological and paleontological sites, noise reduction, wildfire suppression, or management of invasive species. Following is a master list of T&C that are used in the Rawlins Field Office when considering a right-of-way. The list is adapted as needed for site-specific use. Many of the items listed will not be used on a specific grant if not warranted. If, on the other hand, conditions call for requirements that are not on the list, BLM specialists can add new T&C. The list is presented in the standard format used for attachment to an approved grant.

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

FORM 2800-14  
(August 1985)

Issuing Office  
Rawlins Field Office

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
RIGHT-OF-WAY GRANT

**SERIAL NUMBER WYW-XXXXXX**

- 
1. A right-of-way is hereby granted pursuant to Section 28 of the Mineral Leasing Act of 1920, as amended (30 U.S.C. 185).

A right-of-way is hereby granted pursuant to Title V of the Federal Land Policy and Management Act of October 21, 1976 (90 Stat. 2776; 43 U.S.C. 1761).

2. Nature of Interest:

- a. By this instrument, the holder:

ABC ROW Company  
PO Box 123  
Somewhere, ST XXXXX

receives a right to construct, operate, maintain, and terminate a/an natural gas pipeline; powerline, well pad, compressor site, access road, etc. on public lands described as follows:

T. 00 N., R. 99 W., 6<sup>th</sup> P.M., County, Wyoming;

section 37: Lot 83, N $\frac{1}{2}$ SW $\frac{1}{4}$ ;

section 38: SW $\frac{1}{4}$ NE $\frac{1}{4}$ , N $\frac{1}{2}$ SE $\frac{1}{4}$ .

- b. The right-of-way or permit area granted herein is XX feet wide, XX feet long and contains XX acres, more or less. If a site type facility, the facility contains XX acres.
- c. This instrument shall terminate on December 31, 20XX unless, prior thereto, it is relinquished, abandoned, terminated, or modified pursuant to the terms and conditions of this instrument or of any applicable Federal law or regulation.
- d. This instrument may be renewed. If renewed, the right-of-way or permit shall be subject to the regulations existing at the time of renewal and any other terms and conditions that the authorized officer deems necessary to protect the public interest.
- e. Notwithstanding the expiration of this instrument or any renewal thereof, early relinquishment, abandonment, or termination, the provisions of this instrument, to the extent applicable, shall continue in effect and shall be binding on the holder, its successors, or assigns, until they have fully satisfied the obligations and/or liabilities accruing herein before or on account of the expiration, or prior termination, of the grant.

3. Rental:

For and in consideration of the rights granted, the holder agrees to pay the Bureau of Land Management fair market value rental as determined by the authorized officer unless specifically exempted from such payment by regulation. Provided, however, that the rental may be adjusted by the authorized officer, whenever necessary, to reflect changes in the fair market rental value as determined by the application of sound business management principles, and so far as practicable and feasible, in accordance with comparable commercial practices.

4. Terms and Conditions:

- a. This grant or permit is issued subject to the holder's compliance with all applicable regulations contained in Title 43 Code of Federal Regulations part 2880.

This grant or permit is issued subject to the holder's compliance with all applicable regulations contained

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

in Title 43 Code of Federal Regulations part 2800.

- b. Upon grant termination by the authorized officer, all improvements shall be removed from the public lands within 90 days, or otherwise disposed of as provided in paragraph (4)(d) or as directed by the authorized officer.
- c. Each grant issued for a term of 20 years or more shall, at a minimum, be reviewed by the authorized officer at the end of the 20th year and at regular intervals thereafter not to exceed 10 years. Provided, however, that a right-of-way or permit granted herein may be reviewed at any time deemed necessary by the authorized officer.
- d. The stipulations, plans, maps, or designs set forth in Exhibits A (Map) and B (Plan of Development) attached hereto, are incorporated into and made a part of this grant instrument as fully and effectively as if they were set forth herein in their entirety.
- e. Failure of the holder to comply with applicable law or any provision of this right-of-way grant or permit shall constitute grounds for suspension or termination thereof.
- f. The holder shall perform all operations in a good and workmanlike manner so as to ensure protection of the environment and the health and safety of the public.
- g. The holder shall comply with all Federal, State, and local regulations whether or not specifically mentioned within this grant.
- h. No surface disturbing activities shall take place on the subject right-of-way until the associated APD is approved. The holder will adhere to special stipulations in the Surface Use Program of the approved APD, relevant to any right-of-way facilities.
- i. The holder shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the plan of development which was approved and made part of this grant. Any relocation, additional construction, or use that is not in accord with the approved plan of development, shall not be initiated without the prior written approval of the authorized officer. A copy of the complete right-of-way grant, including all stipulations and approved plan of development, shall be made available on the right-of-way area during construction, operation, and termination to the authorized officer. Noncompliance with the above will be grounds for an immediate temporary suspension of activities if it constitutes a threat to public health and safety or the environment.
- j. The holder shall protect all survey monuments found within the right-of-way. Survey monuments include, but are not limited to, General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the holder shall immediately report the incident, in writing, to the authorized officer and the respective installing authority if known. Where General Land Office or Bureau of Land Management right-of-way monuments or references are obliterated during operations, the holder shall secure the services of a registered land surveyor or a Bureau cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the Manual of Surveying Instructions for the Survey of the Public Lands in the United States, latest edition. The holder shall record such survey in the appropriate county and send a copy to the authorized officer. If the Bureau cadastral surveyors or other Federal surveyors are used to restore the disturbed survey monument, the holder shall be responsible for the survey cost.
- k. Any cultural and/or paleontological resource (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the authorized officer after consulting with the holder.
- l. Weeds shall be controlled on project disturbed areas and native areas infested as a direct result of the project. The control methods shall be in accordance with the approved weed management plan (to be

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

submitted by the Holder), and guidelines established by the EPA, BLM, state and local authorities. Prior to the use of pesticides, the holder will obtain written approval from the BLM Authorized Officer—Weed Coordinator (meaning an approved Pesticide Use Proposal form).

- m. To further reduce the spread of invasive and noxious weeds following construction activities, inspections for weeds will be conducted each year along with revegetation monitoring during the first five years following construction. Thereafter, weed surveys would be conducted at least once every three years at appropriate times as directed by the authorized officer, for the life of the project. Reports of these surveys will be submitted to the authorized officer within 30 days of the surveys.
- n. The holder of this right-of-way grant or the holder's successor in interest shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d et seq.) and the regulations of the Secretary of the Interior issued pursuant thereto.
- o. The holder shall contact the authorized officer at least 48 hours (two days) prior to the anticipated start of construction and/or any surface disturbing activities. This can be done by logging into: [http://www.blm.gov/wy/st/en/field\\_offices/Rawlins/oil\\_and\\_gas.html](http://www.blm.gov/wy/st/en/field_offices/Rawlins/oil_and_gas.html). Then click on **Right-of-Way Construction Notice** and fill in the form and submit it. Or, you may call the authorized officer. The authorized officer may require and schedule a preconstruction conference with the holder prior to the holder's commencing construction and/or surface disturbing activities on the right-of-way. The holder and/or his representative shall attend this conference. The holder's contractor, or agents involved with construction and/or any surface disturbing activities associated with the right-of-way, shall also attend this conference to review the stipulations of the grant including the plan of development.
- p. The holder shall have, on-site, a qualified individual (not the dirt contractor) to serve as Compliance Coordinator. This individual will be responsible for assuring that all requirements of the Plan of Development and appropriate Additional Terms and Conditions are applied. **The holder must provide the name of the Compliance Coordinator to the authorized officer prior to any surface disturbance.**
- q. No construction or routine maintenance activities shall be performed during periods when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of **four (4)** inches deep, the soil shall be deemed too wet to adequately support construction equipment.
- r. Within 90 days of completion, the holder will submit to the authorized officer, as-built drawings and a certification of construction verifying that the facility has been constructed (and tested) in accordance with the design, plans, specifications, and applicable laws and regulations.
- s. The holder shall conduct all activities associated with the construction, operation, and termination of the right-of-way within the authorized limits of the right-of-way.
- t. The holder shall inform the authorized officer within 48 hours of any accidents on federal lands that require reporting to the Department of Transportation as required by 49 CFR Part 195.
- u. The holder(s) shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder(s) shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) with regard to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR, Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR, Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.
- v. The holder of Right-of-Way No. WYW-XXXXXX agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901 et seq.) on the right-of-way (unless the release or threatened release is wholly unrelated to the right-of-way holder's activity on the right-of-way. This agreement applies without regard to whether a release is caused by the holder, its agent,

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

or unrelated third parties.

- w. In the event that the public land underlying the right-of-way (ROW) encompassed in this grant, or a portion thereof, is conveyed out of Federal ownership and administration of the ROW or the land underlying the ROW is not being reserved to the United States in the patent/deed and/or the ROW is not within a ROW corridor being reserved to the United States in the patent/deed, the United States waives any right it has to administer the right-of-way, or portion thereof, within the conveyed land under Federal laws, statutes, and regulations, including the regulations at 43 CFR Part [2800][2880], including any rights to have the holder apply to BLM for amendments, modifications, or assignments and for BLM to approve or recognize such amendments, modifications, or assignments. At the time of conveyance, the patentee/grantee, and their successors and assigns, shall succeed to the interests of the United States in all matters relating to the right-of-way, or portion thereof, within the conveyed land and shall be subject to applicable State and local government laws, statutes, and ordinances. After conveyance, any disputes concerning compliance with the use and the terms and conditions of the ROW shall be considered a civil matter between the patentee/grantee and the ROW Holder.
  - x. A litter policing program shall be implemented by the holder, and approved of in writing by the authorized officer, which covers all roads and sites associated with the right-of-way.
  - y. For the purpose of determining joint maintenance responsibilities, the holder shall make road use plans known to all other authorized users of the road. Holder shall provide the authorized officer, within 30 days from the date of the grant, with the names and addresses of all parties notified, dates of notification, and method of notification. Failure of the holder to share proportionate maintenance costs on the common use access road in dollars, equipment, materials, or manpower with other authorized users may be adequate grounds to terminate the right-of-way grant. The determination as to whether this has occurred and the decision to terminate shall rest with the authorized officer. Upon request, the authorized officer shall be provided with copies of any maintenance agreement entered into. Authorized users are as follows: name(s) and address(s)
  - z. Prior to termination of the right-of-way, the holder shall contact the authorized officer to arrange a pre-termination conference. This conference will be held to review the existing reclamation plan and termination provisions of the grant or agree to a new updated reclamation plan.
5. Additional Terms and Conditions:

### Wildlife Resources\*:

- a. Surface disturbing and disruptive activities potentially disruptive to nesting raptors are prohibited from February 1 to July 15. (Golden eagle, barn owl, red-tailed hawk, great-horned owl, other raptors)  
  
Surface disturbing and disruptive activities potentially disruptive to nesting raptors are prohibited April 1 to July 31. (Osprey, merlin, sharp-shinned hawk, kestrel, prairie falcon, northern harrier, Swainson's hawk, Cooper's hawk)  
  
Surface disturbing and disruptive activities potentially disruptive to nesting raptors are prohibited March 1 to July 31. (Short-eared owl, long-eared owl, ferruginous hawk, peregrine falcon, screech owl)  
  
Surface disturbing and disruptive activities potentially disruptive to nesting raptors are prohibited April 15 to September 15. (Burrowing owl)  
  
Surface disturbing and disruptive activities potentially disruptive to nesting raptors are prohibited April 1 to August 31. (Goshawk)

[\*\*\*\*Realty Specialists-Please remove raptor species from the applied stipulation, for reference only\*\*\*\*]

**Please note that the above raptor stipulation(s) may differ from past raptor stipulations as a result of the signing of the Record of Decision for the new Rawlins Resource Management Plan on December 24, 2008.**

Surface disturbing and disruptive activities potentially disruptive to Western yellow-billed cuckoos are prohibited within one-half mile of identified habitat from April 15 to August 15 for the protection of nesting Western yellow-billed cuckoos.

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

Surface disturbing and disruptive activities within big game crucial winter range are prohibited during the period of November 15 to April 30.

Surface disturbing activities or occupancy are prohibited on and within one-quarter mile of the perimeter of an occupied greater sage-grouse or sharp-tailed grouse lek. Disruptive activities are prohibited between 6pm-9am, March 1-May 20 on and within one-quarter mile of lek perimeter.

Surface disturbing and disruptive activities potentially disruptive to delineated greater sage-grouse/sharp-tailed grouse winter concentration areas are prohibited during the period of November 15-March 14.

Avoid surface disturbing and disruptive activities, geophysical surveys, and organized recreational activities (events) that require a special use permit within 2 miles of the perimeter of an occupied greater sage-grouse lek, within 1 mile of the perimeter of a sharp-tailed grouse lek, or in greater sage-grouse and sharp-tailed grouse nesting and early brood rearing habitat from March 1 to July 15.

Surface disturbing and disruptive activities are prohibited during the period of May 1 to June 30 for the protection of elk calving areas.

Surface disturbing and disruptive activities located in potential mountain plover habitat are prohibited during the reproductive period of April 10 to July 10 for the protection of nesting plover. Additional protection measures may be applied if this area is later determined to be within occupied habitat.

The project is located within an area where mountain plover broods and/or adults have been found. Additional protection measures that will be applied are attached.

Any exceptions to this/these requirements must have prior written approval from the authorized officer.

**\*Please be advised that due to limits on the available time of qualified personnel, the unpredictability of wildlife, and future weather conditions, requests for exceptions to impending wildlife stipulations will only be considered in the event of extraordinary and unavoidable occurrences over which the company has little or no control. Additionally, construction of the facility needs to be started in a time frame which would allow for reasonably normal completion prior to the beginning date of wildlife protection stipulations.**

- b. If any dead or injured threatened, endangered, proposed, or candidate animal species is located during construction or operation, the U.S. Fish and Wildlife Service's Wyoming Field Office (307-772-2374), their law enforcement office (307-261-6365), and the BLM Rawlins Field Office (307-328-4200) shall be notified within 24 hours. If any dead or injured sensitive species is located during construction or operation, the BLM Rawlins Field Office shall also be notified within 24 hours.
- c. The holder and holder's sub-contracted personnel shall not intentionally harm or harass wild horses, other wildlife, or domestic livestock.

### Cultural Resources:

a.

### AAAA Resources:

a.

### BBBB Resources:

a.

### CCCC Resources:

a.

### Construction:

- a. All design, material, and construction, operation, maintenance, and termination practices shall be in accordance with safe and proven engineering practices.



## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

- b. The holder shall provide for the safety of the public entering the right-of-way. This includes, but is not limited to barricades for open trenches, flagmen/women with communication systems for single-lane roads without intervisible turnouts, and attended gates for blasting operations.
- c. The holder shall survey and clearly mark the centerline and/or exterior limits of the right-of-way.
- d. Construction sites shall be maintained in a sanitary condition at all times; waste materials at those sites shall be disposed of promptly at an appropriate waste disposal site. "Waste" means all discarded matter including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, and equipment.
- e. Construction over and/or immediately adjacent to existing pipelines shall be coordinated, and in accordance with, the relevant pipeline companies' policy.
- f. Construction-related traffic shall be restricted to routes approved by the AO. New access roads or cross-country vehicle travel will not be permitted unless prior written approval is given by the AO. Authorized roads used by the holder shall be rehabilitated or maintained when construction activities are complete as approved by the AO.
- g. Existing roads and trails on public lands that are blocked as the result of the construction project shall be rerouted or rebuilt as directed by the AO.
- h. Fences, gates, and brace panels shall be reconstructed to appropriate Bureau standards and/or specifications as determined by the AO.
- i. When construction activity in connection with the right-of-way breaks or destroys a natural barrier used for livestock control, the gap, thus opened, shall be fenced to prevent the drift of livestock. The subject natural barrier shall be identified by the AO and fenced by the holder as per instruction of the AO.
- j. Accumulated snow present on the ground at the outset of construction, maintenance, or reclamation activities shall be removed before the soil is disturbed and piled downhill from the disturbed area. Equipment used for any non-construction snow removal operations will be equipped with 6" shoes to ensure blades do not remove topsoil or vegetation and written approval must be obtained before snow removal related to a federal action **but** outside of designated areas is undertaken.
- k. Prior to fill construction, the existing surface shall be sloped to avoid sharp banks and allow equipment operations. No fills shall be made with frozen or water saturated soils. Construction equipment shall be routed evenly over the entire width of the fill to obtain a thorough compaction.
- l. Construction holes left open over night shall be covered. Covers shall be secured in place and shall be strong enough to prevent livestock or wildlife from falling through and into a hole.
- m. Holder shall limit excavation to the areas of construction. No borrow areas for fill material will be permitted on the site. All off-site borrow areas must be approved in writing by the AO in advance of excavation. All waste material resulting from construction or use of the site by holder shall be removed from the site. All waste disposal sites on public land must be approved in writing by the AO in advance of use.
- n. Remove, and clearly segregate from all other spoil, all available topsoil from constructed locations, including areas of cut and fill, and stockpile at the site for use in reclamation on all other areas of surface disturbance (roads, pipelines, etc.).
- o. Drainage and runoff shall be diverted away from all new construction. All drainage structures shall simulate topographic contour lines, have a grade no greater than .5 - 1 percent, and shall release water onto undisturbed ground without causing additional and/or accelerated erosion.

### Operations:

- a. Except rights-of-way expressly authorizing a road after construction of the facility is completed, the holder shall not use the right-of-way as a road for purposes other than routine maintenance as determined necessary by the AO in consultation with the holder.
- b. The holder shall meet Federal, State, and local emission standards for air quality.

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

- c. The holder shall perform all operations in a good and workmanlike manner so as to ensure protection of the environment and the health and safety of the public.
- d. Holder shall maintain the right-of-way in a safe, usable condition, as directed by the AO.
- e. The holder must be prepared to provide BLM copies of applications for and approved federal, state, and local operating permits.
- f. If snow removal from the road is undertaken, equipment used for snow removal operations shall be equipped with shoes to keep the blade six-inches off the road surface. Holder shall take special precautions where the surface of the ground is uneven and at drainage crossings to ensure that equipment blades do not destroy vegetation.
- g. The holder shall permit free and unrestricted public access to and upon the right-of-way for all lawful purposes except for those specific areas designated as restricted by the authorized officer to protect the public, wildlife, livestock or facilities constructed within the right-of-way.

### Reclamation:

- a. The holder shall submit, in accordance with relevant EIS or AO determined dates, an annual report detailing the status of interim or final reclamation work and associated action for this ROW during the previous calendar year.
- b. The holder shall restore drainages, to the greatest extent possible, to the original bank configuration, stream bottom width, and channel gradient. Loose soil, fill, and culverts shall be removed from drainage channels as directed by the AO.
- c. The holder shall construct waterbars on all disturbed areas. Waterbars are to be constructed to: (1) simulate the imaginary contour lines of the slope (**ideally with a grade of one or two percent**); (2) drain away from the disturbed area; and (3) begin and end in vegetation or rock whenever possible.
- d. Any subsequent re-disturbance of interim reclamation shall be reclaimed within six (6) months by the same means described herein.
- e. Temporary fencing of the reclaimed well/facilities locations for the first two growing seasons after either interim or final seeding may be required to exclude livestock and wildlife and to help ensure better re-vegetation success. Similarly, off-road vehicle prevention measures shall be employed on reclaimed locations.
- f. All practicable measures will be utilized to minimize erosion and stabilize disturbed soils. Should the use or storage of hay, straw, or mulch be necessary, the holder is required to use certified weed-free hay, straw, and mulch on BLM lands.

### Pipelines:

- a. No surface disturbing activities shall take place on the subject right-of-way until the associated APD is approved. The holder will adhere to special stipulations in the Surface Use Program of the approved APD, relevant to any right-of-way facilities.
- b. Prior to any discharge, hydrostatic testing water will be tested and processed, if necessary, to ensure that the water meets local, State or Federal water quality standards. Prior to discharge of hydrostatic testing water from the pipeline, the holder shall design and install a suitable energy dissipater at the outlets, and design and install suitable channel protection structures necessary to ensure that there will be no erosion or scouring of natural channels within the affected watershed as a result of such discharge. The holder will be held responsible for any erosion or scouring resulting from such discharge. Sandbags, rock, or other materials or objects installed shall be removed from the site upon completion of hydrostatic testing.
- c. The holder shall design and construct adequate water-control structures in each drainage crossing to prevent excessive erosion along the pipeline and protect the pipeline from the natural erosion process within the drainage.
- d. If during any phase of the construction, operation, or termination of the pipeline or related facilities any oil or other pollutant should be discharged from the pipeline system, or from containers or vehicles impacting Federal lands, the control and total removal, disposal, and cleanup of such oil or other pollutant, wherever

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

found, shall be the responsibility of the holder, regardless of fault. Upon failure of holder to control, cleanup, or dispose of such discharge on or affecting Federal lands, or to repair all damages to Federal lands resulting there from, the AO may take such measures deemed necessary to control, clean up the discharge, and restore the area, including, where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the holder. Such action by the AO shall not relieve the holder of any liability or responsibility.

- e. The holder is prohibited from discharging oil or other pollutants into or upon the navigable waters of the United States, adjoining shorelines, or the waters of the contiguous zone in violation of Section 311 of the Clean Water Act as amended, 33 U.S.C. 1321, and the regulations issued there under, or applicable laws of the State(s) of Wyoming and regulations issued there under. Holder shall give immediate notice of any such discharge to the AO and such other Federal and State officials as are required by law to be given such notice.
- f. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" designated by the Rocky Mountain Five-State Interagency Committee. The color selected for this pipeline is **Shale Green (5Y 4/2)**.
- g. All cathodic protection facilities shall have approval from the Department of Environmental Quality (DEQ) UIC Division and have an approved Class V, Type 5F1 permit.

### Access Roads:

- a. No surface disturbing activities shall take place on the subject right-of-way until the associated APD is approved. The holder will adhere to special stipulations in the Surface Use Program of the approved APD, relevant to any right-of-way facilities.
- b. The holder shall furnish and install culverts of the gauge, materials, diameter(s), and length(s) indicated and approved by the authorized officer. Culverts shall be free of corrosion, dents, or other deleterious conditions. Culverts shall be placed on channel bottoms on firm, uniform beds which have been shaped to accept them and aligned to minimize erosion. Backfill shall be thoroughly compacted. No equipment shall be routed over a culvert until backfill depth is adequate to protect the culverts.
- c. Surfacing shall be designed to accommodate anticipated loading and traffic volumes and shall provide for future maintenance.
- d. All vehicles shall use only authorized travel routes and shall not use any other access route, such as two-track roads, trails, and pipeline rights-of-way to the drill/well pad and any ancillary facilities.
- e. Two-track roads shall not be cut-off as a direct result of construction, maintenance, or reclamation of the well access road or associated well facilities.
- f. All access roads and drainage control structures, whether existing or newly-constructed, shall be both constructed to resource road standards and regularly maintained in a safe and usable condition as outlined in BLM Manual, Section 9113. A regular maintenance program may include, but is not limited to: blading, ditching, culvert installation, dust control, and gravel surfacing or other activities as specified by the AO.
- g. Prior to construction, road(s) shall be surveyed and staked with construction control stakes set continuously along the centerline at maximum 100-foot intervals (less where needed to be inter-visible) and at all tangent and curve control points, fence or utility crossings, and culverts. In addition to centerline stakes, slope stakes shall be placed at the top of the cut and the bottom of the fill for those portions of the road that are engineered.
- h. Before proposed road construction activities begin, the topsoil must be bladed to the side of the road and stockpiled. The topsoil stockpile shall be contoured so as to prevent water ponding or flow concentration. Once the barrow ditch and the cut slopes are constructed, cleared vegetative material and topsoil that is windrowed shall be spread back onto the cut/fill slopes of the road, removing any windrows or berms remaining at the edge of the road.
- i. The minimum travel-way width of the immediate access road will be 14 feet with turnouts at least 10 feet

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

in width. No structure will be allowed to narrow the road top. The inside slope will be 4:1. The bottom of the ditch will be a smooth V with no vertical cut in the bottom. The outside slope will be 2:1 or shallower. After the road is crowned and ditched with a .03 - .05 ft/ft crown the topsoil and windrowed vegetative material shall be pulled back down on the cut slope so there is no berm left at the top of the cut slope. Turnouts will be spaced at a maximum distance of 1000 feet and will be intervisible. If the access road crosses a floodplain, the ditch shall be flat-bottomed so as to provide material to raise the road.

- j. If soils along the access road route are dry during road construction, use, and/or maintenance, fresh water shall be applied to the road surface to facilitate soil compaction and minimize soil loss as a result of wind erosion.
- k. Construction and surfacing of the new access road shall be complete prior to moving drilling equipment onto the well pad and the presence of heavy vehicular traffic. Compact the top foot of sub-grade to a 95% maximum density as determined by AASHTO T-99. Surface with an appropriate grade of gravel to a minimum depth of four (compacted) inches.
- l. As directed by the authorizing officer, all road segments shall be winterized by providing a well-drained roadway by water baring, maintaining drainage, and any additional measures necessary to minimize erosion and other damage to the roadway or the surrounding public lands.
- m. Culverts shall have a minimum of 12" of fill or 1/2 the pipe diameter, whichever is greater, placed on top of the culvert, and shall be of length sufficient to allow at least 24" of culvert to extend from the fill slope face. The inlet and outlet shall be set on grade. No rocks shall be used in the bed material and no rocks greater than 2" in diameter will be immediately adjacent to the culvert. The entire length of pipe shall be bedded on native material before backfilling, which shall be completed using unfrozen material and rocks no larger than two inches in diameter; compact the backfill evenly in 6" lifts on both sides of the culvert. A permanent marker shall be installed at both ends of the culvert to help prevent traffic from damaging the culvert. Additional culverts will be placed in the new access road as the need arises or as directed by AO.
- n. Wing-ditches shall be staked and constructed at a slope of .5 to 1.0 percent down slope unless otherwise approved by the AO. In no case shall wing-ditches discharge adjacent to a channel bank.
- o. All drainage ditches and culverts shall be kept clear and free-flowing, and shall also be maintained in accordance with the original construction standards.

### Well Pads:

- a. No surface disturbing activities shall take place on the subject right-of-way until the associated APD is approved. The holder will adhere to special stipulations in the Surface Use Program of the approved APD, relevant to any right-of-way facilities.
- b. Construction control stakes shall be placed as necessary to ensure construction of the well pad, topsoil stockpile, spoil pile, and outer limits of the area to be disturbed in accordance with the specifications outlined in the APD. The holder shall assume full responsibility for protecting all stakes and offsetting any additional stakes or grades which may be necessary.
- c. All facilities on location that have the potential to leak/spill oil, glycol, methanol, produced water, condensate, or other fluids which may constitute a hazard to the environment, public health or safety (including, but not limited to, drain sumps, sludge holdings, and chemical containers), shall be within secondary containment, impervious to those fluids, exclusive of wildlife and livestock, with animal/bird escape capability, and able to contain a minimum of 110% of the volume of the largest storage vessel, respective to content, or 100% with at least one foot of freeboard, whichever is greater, so that any spill or leakage would not drain, infiltrate, or otherwise escape to ground water, surface water, or navigable waters before cleanup can be completed (within 72 hours).
- d. The holder shall comply with the construction practices and mitigating measures established by 33 CFR 323.4, which sets forth the parameters of the "nationwide permit" required by Section 404 of the Clean Water Act. If the proposed action exceeds the parameters of the nationwide permit, the holder shall obtain an individual permit from the appropriate office of the Army Corps of Engineers and provide the AO with a copy of same. Failure to comply with this requirement shall be cause for suspension or termination of this right-of-way grant.

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

- e. Fencing shall be installed around produced water, oil, and condensate tank batteries in order to help maintain the integrity of the surrounding containment structure and to prevent livestock and wildlife from entering the area in case of a leak or spill.
- f. All open vent stack equipment shall be designed and constructed to prevent entry by birds and bats and to discourage perching.
- g. The holder is prohibited from discharging oil or other pollutants into or upon the navigable waters of the United States, adjoining shorelines, or the waters of the contiguous zone in violation of Section 311 of the Clean Water Act as amended, 33 U.S.C. 1321, and the regulations issued there under, or applicable laws of the State(s) of Wyoming and regulations issued there under. Holder shall give immediate notice of any such discharge to the AO and such other Federal and State officials as are required by law to be given such notice.
- h. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be a color which simulates "Standard Environmental Colors" designated by the Rocky Mountain Five-State Interagency Committee. The color selected for this pipeline is **Shale Green (5Y 4/2)**.
- i. All roads and parking areas shall be constructed to provide drainage and minimize erosion. Culverts shall be installed if necessary to maintain drainage. All areas to be used for roads and parking shall be surfaced with gravel (before the drilling rig or other drilling equipment moves onto the pad).
- j. Emissions of particulate matter from well pad, road, and other facility construction, operation, and reclamation activities will be minimized by application of water or other dust suppressants. Dust inhibitors (surfacing materials, dust suppressants, and water) will be used as necessary on locations that present a fugitive dust problem. The use of chemical dust suppressants on public surface will require prior approval from the BLM Authorized Officer.
- k. If groundwater or permeable/porous subsoil or bedrock is encountered upon construction of the pad or pits, or upon drilling and completing shallow holes for surface conductor, rat/mouse holes, or water supply well, the holder must immediately notify the BLM Authorized Officer (AO) before proceeding.
- l. The holder shall comply with the Hazardous Materials Management Plan/Summary in the EIS, including requirements to transport, store, utilize, and dispose of hazardous substances. The holder shall maintain a hazardous substances release contingency plan that shall include, among other things, provision to notify the BLM Authorized Officer in the event of any release of hazardous substances associated with project operations.
- m. Interim reclamation of all disturbed areas not needed for production operations, including unnecessary access roads and pipeline right(s)-of-way, shall commence and be completed within six (6) months from date of reaching total depth or determination of inactivity. All fill and stockpiled soils shall be distributed on disturbed areas and the production pad shall be as small as possible to allow for safe and prudent production operations.
- n. Temporary fencing of the reclaimed well/facilities locations for the first two growing seasons after either interim or final seeding may be required to exclude livestock and wildlife and to help ensure better re-vegetation success. Similarly, off-road vehicle prevention measures shall be employed on reclaimed locations.
- o. Any topsoil to be stockpiled for longer than six (6) months shall be spread in layers of 2 feet maximum thickness, signed, and stabilized with a suitable cover crop (immediately post-construction and until successful) as approved of by the AO.
- p. Cathodic protection wells shall be drilled on the existing well pad, placed so as not to interfere with re-contouring of cut and fill slopes during interim reclamation, designed and constructed to prevent commingling and contamination of water aquifers. The AO shall be notified of any water flows at surface and the problem will be resolved promptly.

### Pits:

- a. All oil and gas pits containing fracture/stimulation fluids are required to be lined with an impermeable (12

## APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL

mil minimum with a permeability less than or equal to  $1 \times 10^{-7}$  cm/sec) liner. The liner shall be physically and chemically-compatible with all substances which it may contact and shall be of sufficient strength and thickness to withstand normal installation and use, and installed so that it will not leak. The liner shall be installed over a smooth sub-grade, matting, or fill materials (e.g. sifted dirt, sand, or bentonite) free of pockets, loose rocks, and other objects that could damage the liner.

- b. The only fluids/waste materials which are authorized to go into reserve pits are RCRA-exempt exploration and production wastes.
- c. Any evidence of RCRA non-exempt wastes being put into the reserve pit may result in the BLM Authorized Officer requiring specific testing and closure requirements.
- d. Flaring of gas into the reserve or completion pits will not be allowed without prior approval from the AO.
- e. Pits are to be dried within six (6) months from the date that total depth was reached and prior to any backfilling. Trenching or squeezing is prohibited. Pits, once dry, shall be backfilled and compacted with a minimum cover of five (5) feet of soil, void of any topsoil, vegetation, large stones, rocks or foreign objects. The pit area shall be mounded to allow for settling and to promote positive surface drainage away from the pit. Before backfilling synthetically lined reserve pits, those liner portions remaining above the "mud line" shall be cut off as close to the top of the mud surface as possible and disposed of at an approved solid waste disposal facility. The pit bottom and remaining liner shall not be trenched, cut, punctured, or perforated. Installation and operation of any sprinklers, pumps, and related equipment shall ensure that water spray or mist does not drift outside of pit boundaries.
- f. All pits are required to maintain 2 feet of freeboard. If operations cause fluid levels in pits to rise above the required freeboard, immediate notification shall be provided to the AO with concurrent steps taken to cease the introduction of additional fluids, until alternative containment methods can be approved.
- g. For the protection of livestock and wildlife, all pits and open cellars shall be fenced on all sides, with corner bracing, immediately upon construction. Reserve, flare, completion, and production pits will be adequately fenced during and after drilling operations until pits are reclaimed so as to effectively keep out wildlife and livestock. Approved netting (mesh diameter no larger than one inch) is required over any pit that contains or is identified as containing hydrocarbons or hazardous substances (per RCRA 40 CFR Part 261 or CERCLA Section 101(14) (E)).
- h. Only those hazardous wastes that qualify as exempt, under the Resource Conservation and Recovery Act (RCRA), Oil and Gas Exemption, may be disposed of in the reserve pit. *Generally, oil or gas wastes are exempt if they 1) have been sent down hole and then returned to the surface during oil/gas operations involving exploration, development, or production, or 2) have been generated during the removal of produced water or other contaminants from the oil/gas production stream.* The term hazardous waste, as referred to above, is defined as a listed (40 CFR 261.31-33) or characteristic (40 CFR 261.20-24) hazardous waste under RCRA.

### Water:

- a. If temporary surface lines are used to transport drilling water, lines shall be placed/removed when the ground surface is dry; no surface blading is allowed. The surface pipelines must be removed within 30 days after completion (or determination of inactivity) of the well.
- b. All disposal and management of produced water must be in accordance with Onshore Oil and Gas Order No. 7.
- c. Any changes to water sources/supplies, fate of drilling/completion fluids, routes and means of fluid transportation, and location or method of produced water disposal must first have written approval from the AO.
- d. Within 90 days of initial production start-up the holder shall submit to the BLM authorized officer an analysis of the produced water.

**APPENDIX C—BEST MANAGEMENT PRACTICES AND CONDITIONS OF APPROVAL**

**IN WITNESS WHEREOF, The undersigned agrees to the terms and conditions of this right-of-way grant or permit.**

\_\_\_\_\_  
**(Signature of Holder)**

\_\_\_\_\_  
**(Title)**

\_\_\_\_\_  
**(Date)**

\_\_\_\_\_  
**(Signature of BLM Authorized  
Officer)**

**Field Manager, Rawlins Field Office**  
\_\_\_\_\_  
**(Title)**

\_\_\_\_\_  
**(Effective Date of Grant)**

## APPENDIX D: PALEONTOLOGICAL RESOURCES PROGRAM GUIDANCE

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## APPENDIX D—PALEONTOLOGICAL RESOURCES PROGRAM GUIDANCE

### INSTRUCTION MEMORANDUM NO. 2008-009

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
Washington, D.C. 20240

October 15, 2007

In Reply Refer To:  
1610, 8270 (240) P

EMS TRANSMISSION 10/18/2007

**Expires:** 09/30/2009

**To:** All State Directors

**From:** Assistant Director, Renewable Resources and Planning

**Subject:** **Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands**

**Program Areas:** Paleontological Resources Management, Resource Management Planning, Lands and Realty Management, Minerals Management, Range

**Purpose:** This Instruction Memorandum (IM) transmits the Bureau of Land Management (BLM) classification system for paleontological resources on public lands. The classification system is based on the potential for the occurrence of significant paleontological resources in a geologic unit, and the associated risk for impacts to the resource based on Federal management actions. Copies of the classification system and implementation guidance are attached.

**Policy/Action:** The Potential Fossil Yield Classification (PFYC) system will be used to classify paleontological resource potential on public lands in order to assess possible resource impacts and mitigation needs for Federal actions involving surface disturbance, land tenure adjustments, and land-use planning. Implementation of the PFYC system will not mandate changes to existing land use plans, project plans, or other completed efforts. Integration into plans presently being developed is discretionary. All efforts subsequent to issuance of this IM should incorporate the PFYC system. This system will replace the current Condition Classification in the Handbook (H-8270-1) for Paleontological Resource Management.

**Timeframe:** This guidance is effective immediately for all BLM offices.

**Background:** This classification system for paleontological resources is intended to provide a more uniform tool to assess potential occurrences of paleontological resources and evaluate possible impacts. It uses geologic units as base data, which is more readily available to all users. It is intended to be applied in broad approach for planning efforts, and as an intermediate step in evaluating specific projects. This is part of a larger effort to update the Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) Chapter III (Assessment & Mitigation) and Chapter II.A.2 and will be incorporated into that Handbook update.

**Impact on Budget:** Costs for the initial classification of geologic units for those States that have not already determined the classification will be borne by each Office. Implementation of the PFYC system will have no additional costs.

## APPENDIX D—PALEONTOLOGICAL RESOURCES PROGRAM GUIDANCE

**Manual/Handbook Affected:** Supersedes H-8270-1 (General Procedural Guidance for Paleontological Resource Management) Chapter II.A.2.

**Coordination:** The classification system is the product of the BLM's regional paleontologists, other BLM employees, and outside reviewers. This system is very similar to the Forest Service's Fossil Yield Potential Classification and will enable closer coordination of paleontological resource management between the agencies.

**Contact:** For questions regarding application of this policy and guidance, please contact Lucia Kuizon, National Paleontologist, at (202) 452-5107 or lkuizon@blm.gov.

Signed by: Todd S. Chirstensen  
Acting, Deputy Assistant Director  
Renewable Resources and Planning

Authenticated by: Robert M. Williams  
Division of IRM Governance

2 Attachments:

- 1 – The Potential Fossil Yield Classification (PFYC) System (4 pp)
- 2 – Guidance for Implementing the PFYC System (5 pp)

**Attachment 1.**

**Potential Fossil Yield Classification (PFYC) System**

Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

Using the Potential Fossil Yield Classification (PFYC) system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed mappable level. It is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions.

The descriptions for the classes below are written to serve as guidelines rather than as strict definitions. Knowledge of the geology and the paleontological potential for individual units or preservational conditions should be considered when determining the appropriate class assignment. Assignments are best made by collaboration between land managers and knowledgeable researchers.

**Class 1 – Very Low.** Geologic units that are not likely to contain recognizable fossil remains.

- Units that are igneous or metamorphic, excluding reworked volcanic ash units.
- Units that are Precambrian in age or older.

(1) Management concern for paleontological resources in Class 1 units is usually negligible or not applicable.

(2) Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances.

The probability for impacting any fossils is negligible. Assessment or mitigation of paleontological resources is usually unnecessary. The occurrence of significant fossils is non-existent or extremely rare.

**Class 2 – Low.** Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.

- Vertebrate or significant invertebrate or plant fossils not present or very rare.
- Units that are generally younger than 10,000 years before present.
- Recent aeolian deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

(1) Management concern for paleontological resources is generally low.

(2) Assessment or mitigation is usually unnecessary except in rare or isolated circumstances.

The probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Assessment or mitigation of paleontological resources is not likely to be necessary. Localities containing important resources may exist, but would be rare and would not influence the classification. These important localities would be managed on a case-by-case basis.

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**Class 3 – Moderate or Unknown.** Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

- Often marine in origin with sporadic known occurrences of vertebrate fossils.
- Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.

(or)

- Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

**Class 3a – Moderate Potential.** Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

**Class 3b – Unknown Potential.** Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this Class may eventually be placed in another Class when sufficient survey and research is performed. The unknown potential of the units in this Class should be carefully considered when developing any mitigation or management actions.

- (1) Management concern for paleontological resources is moderate; or cannot be determined from existing data.
- (2) Surface-disturbing activities may require field assessment to determine appropriate course of action.

This classification includes a broad range of paleontological potential. It includes geologic units of unknown potential, as well as units of moderate or infrequent occurrence of significant fossils. Management considerations cover a broad range of options as well, and could include pre-disturbance surveys, monitoring, or avoidance. Surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources. These units may contain areas that would be appropriate to designate as hobby collection areas due to the higher occurrence of common fossils and a lower concern about affecting significant paleontological resources.

**Class 4 – High.** Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases.

**Class 4a –** Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact some areas.

**Class 4b –** These are areas underlain by geologic units with high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

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- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
  - Areas of exposed outcrop are smaller than two contiguous acres.
  - Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
  - Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.
- (1) Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action.
  - (2) A field survey by a qualified paleontologist is often needed to assess local conditions.
  - (3) Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered.
  - (4) Class 4 and Class 5 units may be combined as Class 5 for broad applications, such as planning efforts or preliminary assessments, when geologic mapping at an appropriate scale is not available. Resource assessment, mitigation, and other management considerations are similar at this level of analysis, and impacts and alternatives can be addressed at a level appropriate to the application.

The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation considerations must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access resulting in greater looting potential. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.

**Class 5 – Very High.** Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

*Class 5a* – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. Unit is frequently the focus of illegal collecting activities.

*Class 5b* – These are areas underlain by geologic units with very high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
  - Areas of exposed outcrop are smaller than two contiguous acres.
  - Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
  - Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.
- (1) Management concern for paleontological resources in Class 5 areas is high to very high.

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- (2) A field survey by a qualified paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions.

- (3) Official designation of areas of avoidance, special interest, and concern may be appropriate.

The probability for impacting significant fossils is high. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys prior to authorizing any surface-disturbing activities will usually be necessary. Onsite monitoring may be necessary during construction activities.

**Attachment 2.**

**Guidance for Implementing the Potential Fossil Yield Classification (PFYC) System**

**Introduction**

The Potential Fossil Yield Classification (PFYC) system will aid in assessing the potential for discovery of significant paleontological resources or the impact of surface disturbing activities to these resources.

It is intended to assist in determining proper mitigation approaches for surface disturbing activities, disposal or acquisition actions, recreation possibilities or limitations, and other BLM-approved activities. It will provide consistent information for input and analysis during planning efforts. The PFYC system can also highlight the areas most likely to be a focus of paleontological research efforts or illegal collecting. It is hoped that this system will allow BLM to direct management efforts toward potentially significant areas and reduce efforts in areas of lower potential.

This classification system was originally developed by the Forest Service's Paleontology Center of Excellence and the Region 2 (FS) Paleontology Initiative in 1996. Modifications were made by the BLM's Paleontological Resources staff in subsequent years.

Paleontological resources are closely associated with the geologic rock units containing them; that is, fossils are found more frequently in some rock units than others. The management of paleontological resources can thus be tied to the geologic units present at or near the ground surface, with greater management emphasis aimed at higher potential geologic units.

**Uses**

This PFYC system is utilized for land use planning efforts and for the preliminary assessment of potential impacts and proper mitigation needs for specific projects. It is intended to provide a tool to assess potential occurrences of significant paleontological resources. It is meant to be applied in broad approach for planning efforts, and as an intermediate step in evaluating specific projects.

There are five Classes with Class 1 being Very Low Potential and Class 5 being Very High Potential. Although granite, lava beds, and other igneous or metamorphic rock types are usually considered to be void of any fossils, outcrops of these rocks may have fissure fillings, cave-like structures, sinkholes, and other features that may preserve significant paleontological resources or information, so the potential is not zero; therefore Class 1 is applied to these rock types usually considered not to contain fossil resources.

It is intended that this system replace the current Condition Classification in the Handbook (H-8270-1), for Paleontological Resource Management. In general, the following is a comparison of the Condition Classification rankings to the new PFYC Classes:

<b>Classes: Condition</b> (from H-8270-1)	<b>PFYC Class</b> (this Instruction Memorandum)
Condition 1 – Areas known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. (Note: this refers to known localities or groups of localities)	PFYC Class 4 (High) or Class 5 (Very High), based on geologic unit.
Condition 2 – Areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.	PFYC Class 3 (Moderate), Class 4 (High), or Class 5 (Very High), based on geologic unit.
Condition 3 – Areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.	PFYC Class 1 (Very Low) or Class 2 (Low).

### Assignment of Classes

A separate class ranking is assigned to each recognized geologic formation or member present at the surface. Deposits of young alluvium (post-Pleistocene) or thick soils can often be ignored. However, geologic mapping may not separate the older Pleistocene alluvium which, may contain significant vertebrate fossils, and thus these units need to be carefully considered. Available geologic mapping, depending on map scale, may combine multiple formations or units. In these cases, the assigned classification should use the highest class of those included units. For ease of application, the classifications should be integrated into a Geographic Information System (GIS) based geologic map.

The classification is initially determined by the Regional Paleontologist; the State Office Paleontology Lead in collaboration with the Regional Paleontologist; or by knowledgeable individuals from a paleontology museum, university paleontology department, or consulting firm working under a formal agreement. Several States have already completed an initial classification and are incorporating the system into new planning and mitigation efforts.

To maintain consistency in planning efforts, mitigation requirements, and other management approaches, the classification should be applied to each formation on a state-wide basis, and even across State boundaries. But in some situations, geologic characteristics within formations may change across the State or region and may alter the potential for fossil occurrence. These differences may be a characteristic of the formation, be variable in occurrence, and unmappable at a workable scale; or may indicate a regional gradient, where a formation is highly fossiliferous in one portion of the State, but has lowered potential in another area. A variable occurrence in potential may be included in the general information about the formation. A regional gradient can be addressed by assigning a different class for separate areas.

Multiple class assignments for an individual formation should be applied in consultation with the State Office to maintain consistency across Field Office boundaries.

Over time, additional information may be acquired or developed that may suggest that a change in the class assignment is appropriate, especially from the Unknown Class (3b) to a higher or lower class. The classification should reflect the most current information, and recent research or discoveries may indicate a change is warranted. However, any changes should be measured against existing applications or use of the current classification, such as usage in Resource Management Plans (RMPs) or other planning or management documents.

### Application

In planning documents and other general applications, these classes allow for uniform discussion of the paleontologic resource, potential adverse impacts, and management approaches. Assessment of general conditions, such as acres or percentages of each class, or spatial identification of important areas can be determined and presented in simple manner. Identification of areas of potential concern with other resources can be identified using GIS mapping or explained in the text body in simple fashion.

The PFYC classes may also be utilized to assess the possibility of adverse or beneficial impacts from land tenure adjustment (disposal or acquisition) proposals prior to on-the-ground surveys.

A primary purpose of the PFYC is to assess the possible impacts from surface disturbing activities and help determine the need for pre-disturbance surveys and monitoring during construction. This assessment should be an intermediate step in the analysis process; and local conditions such as amount of exposed bedrock should be considered when final mitigation needs are determined. The determination should also be supplemented by occurrences of known fossil localities and local geologic and topographic knowledge.



## Mitigation Needs Assessment

Impacts of most surface-disturbing activities, and the need for mitigation efforts, are addressed by the local Field Office. Some larger actions, such as major pipeline projects, may be handled by the State Office, or even as multi-State projects. In all these cases, the assessment of impacts to paleontological resources and need for mitigation can be addressed in similar fashion through a progression of steps. The following outlines the general steps used to apply the PFYC system to this mitigation process.

1. **Identify the Proposed Action and affected area.** Consider the area directly impacted by the action, as well as areas that may be impacted by vehicle drive ways, equipment parking, storage areas, and increased access. Also consider the depth of disturbance to determine possible subsurface impacts.
2. **Identify the potential impacts to paleontological resources.** Determine the geologic units that may be impacted and the associated PFYC classes, and consult other sources of information about known localities or paleontological research that may have been done previously.

Based on the PFYC class and any additional resource information, determine the probability of impacting significant paleontological resources. If known localities are in the area of possible impact, determine if those localities can be avoided by altering the proposed action, such as repositioning a well pad location or rerouting a pipeline around a locality.

3. **Determine the need for field survey or other mitigation efforts.** On-the-ground field surveys, on-site monitoring, spot-checking at key times during construction, or locality avoidance are all possible mitigation approaches to lessen adverse impacts.
  - If the PFYC class for the impacted area is Class 1 or 2, and there are no known localities within the area, no further assessment is typically needed.
  - If a Class 3a (Moderate Potential) unit underlies the area, the local geologic conditions should be considered, as well as any known localities in the region. It may be necessary to consult with the Regional Paleontologist or other qualified paleontologist to assess the local conditions.
  - If a Class 3b (Unknown Potential) unit underlies the area, it may be appropriate to require an on-site preliminary assessment by a qualified paleontologist.
  - If the area is a Class 4b (buried bedrock with High Potential) or Class 5b (buried bedrock with Very High Potential), an assessment of the possible impacts to bedrock units must be made. If the proposed action will not penetrate the protective soil or alluvial layer, a pre-work survey or monitoring during the activity may not be necessary. If the potential exists to remove the protective layer and impact the bedrock unit below, it may be prudent to require a pre-work field survey and/or on-site monitoring during disturbance or spot-checks at key times. Because the bedrock unit is typically buried for much of the area in question, a pre-work survey may not always be necessary, as the fossil material may not be visible. However, it may then be more important to have an on-site monitor during disturbance or spot-checks at key times.
  - If it is a Class 4a (exposed bedrock with High Potential) or Class 5a (exposed bedrock with Very High Potential) area, it will be necessary in most (Class 4a) or almost all (Class 5a) situations to require a pre-activity field survey of the areas directly and indirectly impacted.
  - Larger projects may impact multiple geologic units with differing PFYC Classes. In those cases, field survey and monitoring may be applied at differing levels. For example, surveys may be appropriate only on the Class 4 and 5 formations and not the Class 2 formations along a pipeline project. Careful mapping and detailed field notes should reflect the differing survey/monitoring intensities, and should be included in the consultant's report to BLM.
4. **Conduct Pre-work Field Survey.** Field surveys are almost always needed for Class 4 and 5 units, especially exposed bedrock areas (Class 4a and 5a). Class 3 units may or may not require a survey.

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Local conditions, such as vegetated areas or pockets of bedrock exposure, may affect the need and intensity of field surveys.

The consultant is required to submit a report of findings after completion of the field survey. In addition to standard reporting information, the report should contain the consultants' recommendations for further mitigation, and this recommendation should be considered when determining the need for and type of on-site monitoring or locality avoidance.

- 5. Monitor during disturbance activities.** Those areas that have been determined to have a Very High potential (Class 5) for adverse impacts should typically be monitored at all times when surface-disturbing activities are occurring. If the area has a High potential (Class 4), it may be appropriate to examine the exposed unit, including the spoil or storage piles, only at key times. These times are dependent on the activity, but typically are: when bedrock is initially exposed, occasionally during active excavation, and when the maximum exposure is reached and before backfilling has begun. This monitoring and spot-checking must be performed by a permitted paleontologist or their BLM-approved representative. The monitor has the authority to briefly pause any activity to inspect a possible find. These pauses are intended to allow for identification of possible fossil resources and should only last a few minutes to a couple hours.
- 6. Evaluate significant finds.** If significant paleontological resources are discovered during surface disturbing actions or at any other time, the proponent or any of his agents must: (a) stop work immediately at that site; (b) contact the appropriate BLM representative, typically the project inspector or Authorized Officer, as soon as possible; and (c) make every effort to protect the site from further impacts, including looting, erosion, or other human or natural damage. The BLM or designated paleontologist will evaluate the discovery and take action to protect or remove the resource within 10 working days. Work may not resume at that location until approved by the official BLM representative. In some cases, such as recovery of a dinosaur, further activity at that site may be delayed until the discovered fossils are recovered, or until the project is modified to avoid impacting the find. Because of the potential for lengthy delays, the BLM should assure that the project proponent understands this possibility prior to approval to begin work.

These steps are included here to provide general guidance, and it may be appropriate to modify or skip them for various situations. However, a brief discussion of the background and reason for modification should be placed in the project file.

For all surface-disturbing activities occurring within Class 3 or higher units, a stipulation should be included in the permitting document.

### Further Information

Detailed information on the geologic units and paleontological resources within a State can often be obtained from State geological surveys, geological or paleontological museums, geology departments at universities or colleges, paleontological permittees or other researchers or within the BLM from Regional Paleontologists or knowledgeable Geologists.

Scientific publications, such as professional journals or State geological survey reports, often contain general and detailed information about paleontological and geological resources relevant to fossil potential and occurrences for specific areas. Current and past paleontological permittee reports usually include precise locality data and maps, and often contain discussions of findings and their significance.

**INSTRUCTION MEMORANDUM NO. 2009-011**

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
WASHINGTON, D.C. 20240

October 10, 2008

In Reply Refer To:  
8270, 1790 (240) P

EMS TRANSMISSION 10/29/2008

**Expires:** 09/30/2010

**To:** All State Directors

**From:** Assistant Director, Renewable Resources and Planning

**Subject:** **Assessment and Mitigation of Potential Impacts to Paleontological Resources**

**Program Areas:** Paleontological Resources Management, Environmental Assessment

**Purpose:** This Instruction Memorandum (IM) provides guidelines for assessing potential impacts to paleontological resources in order to determine mitigation steps for federal actions on public lands under the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA). These guidelines also apply where a federal action impacts split-estate lands. In addition, this IM provides field survey and monitoring procedures to help minimize impacts to paleontological resources from federal actions in the case where it is determined that significant paleontological resources will be adversely affected by a federal action.

**Policy/Action:** It is the policy of the BLM that potential impacts from federal actions on public lands, including land tenure adjustments, be identified and assessed, and proper mitigation actions be implemented when necessary to protect scientifically significant paleontological resources. This policy also applies to federal actions impacting split-estate lands and is subject to the right of landowners to preclude evaluation and mitigation of paleontological resources on their land. Paleontological resources removed from public lands require a Paleontological Resources Use permit for collection. Significant paleontological resources collected from public lands are federal property and must be deposited in an approved repository. Paleontological resources collected from split-estate lands are the property of the surface-estate owner, and their disposition will be in accordance with the surface agreement between the landowner and the permittee.

**Timeframe:** This guidance is effective immediately for all BLM offices.

**Background:** Surface disturbing activities may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils; or loss of valuable scientific information by the disturbance of the stratigraphic context in which fossils are found. Indirect adverse impacts may be created by increased accessibility to important paleontological resources leading to looting or vandalism. Land tenure adjustments may result in the loss of significant paleontological resources to the public if paleontological resources pass from public ownership. Generally, the project proponent is responsible for the cost of implementing mitigation measures including the costs of investigation, salvage and curation of paleontological resources.

This IM together with the Potential Fossil Yield Classification system (PFYC; see IM 2008-009) will provide guidance for the assessment of potential impacts to paleontological resources, field survey and

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monitoring procedures, and recommended mitigation measures that will better protect paleontological resources impacted by federal actions. This guidance expands and clarifies the guidance in the Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) Chapter III (Assessment & Mitigation) and will be incorporated into the next Handbook revision.

**Impact on Budget:** Costs are minimal for implementation of this guidance since mitigation of paleontological resources is already part of any approval of surface-disturbing actions on public lands.

**Manual/Handbook Affected:** Supersedes Handbook H-8270-1 (General Procedural Guidance for Paleontological Resource Management) Chapter III.B.

**Coordination:** Washington Office Division of Cultural and Paleontological Resources and Tribal Consultation.

**Contact:** For questions regarding application of this policy and guidance, please contact Lucia Kuizon, National Paleontologist, at (202) 452-5107 or lkuizon@blm.gov.

Signed by:  
Edwin L. Roberson  
Assistant Director  
Renewable Resources and Planning

Authenticated by:  
Robert M. Williams  
Division of IRM Governance, WO-560

2 Attachments:

- 1- Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources
- 2- Paleontological Resources Assessment Flowchart

**Attachment 1.**  
**Guidelines for Assessment and Mitigation of**  
**Potential Impacts to Paleontological Resources**

**Introduction**

Surface disturbing federal actions on public and split-estate lands may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils or the disturbance of the stratigraphic context in which they are located. Indirect adverse impacts may be created from increased accessibility to fossils leading to looting or vandalism activities. Land tenure adjustments may result in the loss of significant paleontological resources to the public if fossils pass from public ownership.

Under the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA), federal actions and land tenure adjustments that may impact or result in a loss of paleontological resources on public or split-estate lands are evaluated, and necessary mitigation is identified.

**Assessment of Potential Impacts to Paleontological Resources**

The following sections outline general steps designed to assist in the analysis and assessment of possible impacts to paleontological resources from proposed actions. These sections are sequential in order and provide for termination of the assessment at various stages if the analysis indicates no impacts are likely to occur.

**A. Scoping.** Field Offices must assess all proposed federal actions to identify possible effects to significant paleontological resources (see Appendix A for definition) that are potentially recoverable and are likely to be within the zone of expected surface disturbance or relatively close to the surface. The direct effects of all surface activities and the indirect effects of increased public access and land tenure adjustments must be considered in any paleontological assessment. The assessment will determine whether further analysis will be necessary. The Paleontology Program Coordinator (Paleontology Coordinator – see Appendix A for definition) has primary responsibility for the scoping process for projects within the Field Office area, but the Paleontology Program Lead (Paleontology Lead – see Appendix A for definition) may be responsible for projects that span multiple Field or District Offices, and can support the Paleontology Coordinator as requested.

1. Surface only activities – If the proposed project will not disturb potentially fossil-yielding bedrock or alluvium, no additional work is necessary. The project file should be documented as appropriate. Examples of such projects include weed spraying, mechanical brush treatment, geophysical exploration, or surface disturbing activities such as road construction when the fossil resource is expected to be buried well below project compression or excavation depth or when surface fossil resources would be left undamaged.
2. Land Tenure Adjustments – If parcels are identified to pass from public ownership in a proposed land tenure adjustment action but contain no potential for recoverable, significant paleontological resources, no additional work is necessary. The project file should be documented as appropriate, and conclusions addressed in the environmental document. This situation may arise, for example, in areas consisting only of granitic bedrock where paleontological resources would not normally occur.

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3. Young alluvial deposits or deep soils may cover and obscure sedimentary bedrock, and any fossils that may occur in that bedrock would be unidentifiable or irretrievable prior to disturbance actions. In most of these cases, the fossil resources cannot be quantified, but the potential for impacting paleontological resources should be mentioned in the evaluation of the proposal, i.e., the planned disturbance will pass through the soil layer and impact a bedrock unit which is known to contain significant fossils elsewhere.

If the initial scoping identifies the possibility for adversely affecting significant paleontological resources, further analysis is necessary. If there will be no impact or potential impact based on the action or the fossil resource may be impacted, but is too deep to be recovered, e.g., deep well bore passing through a fossil formation, the project file must be documented, and no additional assessment is necessary.

**B. Analysis of Existing Data.** If scoping suggests the possibility of disturbing fossil-yielding bedrock or alluvium that is near to the surface and that may contain significant paleontological resources that are potentially recoverable, more in-depth analysis is necessary. Geologic mapping reflecting the Potential Fossil Yield Classification (PFYC) should be consulted, along with any other easily accessible information, such as GIS-based locality data, other known paleontological locality information, and existing paleontological reports for the area, aerial photos, or soils maps.

1. Potential Fossil Yield Classification (PFYC) – This is a system for categorizing the probability of geologic units to contain scientifically significant paleontological resources or noteworthy fossil occurrences. It has five levels or Classes, with Class 1 applied to geologic units that are not likely to contain significant fossils through Class 5 for geologic formations that have a high potential to yield scientifically significant fossils on a regular basis (see IM No. 2008-009). This classification does not reflect rare or isolated occurrences of significant fossils or individual localities, only the relative occurrence on a formation- or member-wide basis. Any rare occurrences may require additional assessment and mitigation if they fall within the area of anticipated impacts.
2. If the results of the preliminary analysis determine that the proposed project will only affect geologic units not likely to contain significant fossils or that have a very low or low potential for significant fossils (PFYC Class 1 or 2), and no scientifically important localities are known to occur in the area, the project file should be documented, and no additional paleontology assessment is necessary.
3. The results of an analysis of a proposed project may indicate the potential to disturb PFYC Class 3, 4, or 5 formations or potentially fossil-bearing alluvium, or known significant localities, which may then suggest the need for field surveys and/or other mitigation measures. The results may also identify areas where little or nothing is known of the fossil record so that additional attention may be given to these areas during field survey. The analysis should consider the likely impacts on the known or potential fossil resource and should be the basis for determining the need for or level of additional assessments.

**C. Determining the Need for Field Surveys and Mitigation.** The previously discussed procedures may result in the determination that the project may encounter bedrock or an alluvial zone that has a moderate or high potential to contain significant paleontological resources. However, it does not determine the appropriate action, such as a field survey, on-site monitoring, special stipulations, avoidance, or other mitigation.

1. If the need for further work is not clearly evident after the analysis, the Authorized Officer and/or Project Leader should be consulted for a final decision. The Paleontology Lead or Regional Paleontologist may also be consulted. A brief written report of findings should be

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prepared, including the rationale for supporting the decision not to require a field survey or additional monitoring. The report should be signed by the Authorized Officer and placed in the project file. For example, a seismic survey using vibroseis trucks may be proposed on areas of deep soils, or a temporary recreational event may be planned in an area of low fossil potential. These types of projects are not likely to have a reasonable potential to adversely affect important paleontological resources. The file should be documented and a standard discovery stipulation attached to the permit proposal.

2. If the analysis in Sec. I.B indicates a reasonably high expectation of not just encountering a potential fossil-bearing zone and also causing adverse impacts to significant paleontological resources, the determination must be made as to (1) whether adverse effects cannot be avoided; (2) whether the adverse impacts can be avoided by altering the location or scope of the project; (3) whether the impacts can be mitigated through development of special stipulations such as requiring on-site monitoring; or (4) whether field surveys will be necessary to determine the presence or absence of significant paleontological resources.
3. In the case where it is known that significant paleontological resources will be adversely impacted, the preferred course of action is avoidance of the impact by moving or rerouting the site of construction, or eliminating or reducing the need for surface disturbance.
4. Application of specific stipulations may reduce or eliminate adverse impacts in many cases. A standard discovery stipulation should be included in any permit approval that is likely to affect significant paleontological resources. The stipulation should mandate an immediate work stoppage in the area of discovery, notification to the Authorized Officer, and protection of the material and geological context. Other stipulations may be appropriate on a case-by-case basis.

(a) A suggested standard discovery stipulation for a discretionary federal action is:  
The permittee shall immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of operations under this authorization. The permittee shall suspend all activities in the vicinity of such discovery until notified to proceed by the Authorized Officer and shall protect the discovery from damage or looting. The permittee may not be required to suspend all operations if activities can be adjusted to avoid further impacts to a discovered locality or be continued elsewhere. The Authorized Officer will evaluate, or will have evaluated, such discoveries as soon as possible, but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by the Authorized Officer after consulting with the operator. Within 10 days, the operator will be allowed to continue construction through the site, or will be given the choice of either (1) following the Authorized Officer's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (2) following the Authorized Officer's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area.

Note: C.1 and C.2 above would be conducted at the permittee's expense. By regulation, after a 3809 plan of operations is approved or where there is no plan, the BLM is responsible for the cost of any investigation and recovery of fossil materials.

(b) Other stipulations may be developed to reduce potential impacts, preferably in consultation with the project proponent. These may include (1) techniques to reduce surface disturbance, (2) briefings for all personnel about the potential for discovery, (3) requiring all finds be reported, and (3) using a "light touch" in sensitive areas. These should be made a

## APPENDIX D—PALEONTOLOGICAL RESOURCES PROGRAM GUIDANCE

formal part of the authorization for the project and discussed at a preconstruction meeting or an on-site meeting in the case of oil and gas operations.

(c) All proponents should be directed to share the current rules and regulations regarding fossil theft and the limitations to free use collecting of invertebrate and plant fossils on BLM-administered lands with all employees and subcontractors under their direction. Unlawful removal, damage, or vandalism of paleontological resources will be prosecuted by federal law enforcement. Theft or damage to government property by a proponent, a proponent's employee, or a subcontractor that is under a proponent's direction may lead to legal actions against the proponent.

5. If avoidance actions or stipulating measures are insufficient to protect known paleontological resources, a written assessment must be completed to determine the need for field survey or monitoring. This assessment must include the anticipated direct or indirect impacts associated with the project, the inadequacies of avoidance or special stipulations to protect the resource, existing paleontological information and known localities, relevant geologic information, and the potential for additional discoveries. The assessment must be completed by the Paleontology Coordinator.
  - (a) In some cases, bedrock will not be visible at the surface in the project area (for example, where thin soils or alluvium obscure all outcrops), but the proposed excavation will likely penetrate into bedrock with known significant paleontological resources. Because fossil material will not be visible at the ground surface in these cases, it may be appropriate to forego a field survey prior to excavation, but require on-site monitoring or spot-checks when bedrock is finally encountered. If construction monitoring is proposed, the written assessment must include a thorough justification for the recommendation.
  - (b) The State Office may require the Paleontology Coordinator to notify the Paleontology Lead that a field survey or monitoring is deemed appropriate prior to the final decision to require the survey or monitoring. The notification should minimally include the name of the project, the legal description of the location or other locational information, a brief summary of the proposed action, reason(s) for the decision to require a survey or monitoring, and any other relevant information. Concurrence of the Paleontology Lead or Regional Paleontologist may be required prior to the final decision for requiring a survey or monitoring.
  - (c) A standardized assessment document may be developed that can be applied to projects that are similar in nature, relatively small, and repetitive in approach for use within a Field Office or District. This written assessment is intended to simplify the documentation process for those projects that are likely to have minimal impacts, and may be structured as a programmatic assessment, a form, a checklist, or other document with standard items. This assessment must include the name of the project, the legal description of the location or other locational reference, a brief summary of the proposed action, reason(s) for the decision, and any other relevant information. The parameters in the assessment should be designed to identify the need for a field survey. For example, the parameters may indicate a field survey may be required for road and well pad construction activities occurring on Class 4 or 5 formations where the formation is likely to be encountered during surface disturbing activities. The Field Manager, in consultation with the Paleontology Lead, must approve the use of a programmatic assessment prior to initial implementation.
6. The decision to require a field survey or monitoring must be made by the Authorized Officer and documented in the project file. If required, a copy of the decision must be furnished to the Paleontology Lead.



## II. Procedures for Conducting a Paleontological Field Survey

If the assessment of existing data indicates: (a) the presence or high probability of occurrence of vertebrate fossils or uncommon nonvertebrate fossils (PFYC Class 4 or 5), or that the probability is unknown (Class 3), in the area of a proposed federal action or transfer of title, and (b) a reasonable probability that those resources will be adversely affected by the proposed action, a paleontological field survey should be conducted.

**A. Definition of Field Surveys.** Field Surveys are pedestrian surveys to be performed in areas where significant fossils can be expected to occur within the boundary and immediate vicinity of the anticipated disturbance, or where the probability of encountering significant fossils is unknown.

1. Field surveys are performed prior to any surface disturbing activities. Before conducting field surveys, the project location should be as final as possible and any staking of the location should be complete.
2. Surveys are conducted by a BLM Regional Paleontologist, Paleontology Lead, Paleontology Coordinator, appropriately trained and supervised BLM staff, or by a BLM-permitted consulting paleontologist hired by the project proponent.
  - (a) At the Field Manager's discretion, other qualified BLM staff may conduct surveys on small projects. Performance of surveys by BLM staff must also be approved by the Regional Paleontologist, Paleontology Lead, or Paleontology Coordinator.
  - (b) Surveys that are complex in nature, constrained by construction schedules, or otherwise cannot be performed by BLM staff should be performed by a consulting paleontologist holding a valid BLM Paleontological Resources Use Permit. Submission of reports may be done directly by the paleontologist to the BLM. The project proponent is also responsible for all costs associated with the survey, including the consulting paleontologist's fees and charges, all survey costs, fossil preparation to the basic identification stage, analyses, reports, and curation costs directly related to mitigation of the project's anticipated impacts. Any required monitoring and mitigation costs are also the responsibility of the project proponent. These costs are to be negotiated between the project proponent and the consulting paleontologist prior to beginning any data gathering, analysis, or field work, and these negotiations do not require BLM involvement or approval. Any new, additional, or modified curation agreements between the paleontologist and the official repository must be in place prior to starting field work.
  - (c) Authorization for an activity to proceed cannot be given by a consulting paleontologist. Performance of the survey, either by a consulting paleontologist or BLM staff, or submission of the report DOES NOT constitute approval for the activity to proceed. The BLM must review the report, including adequacy of the field methods and findings. The Authorized Officer must approve the findings and determine the need for monitoring prior to approval to proceed.

**B. Conducting Field Surveys.** Field surveys must be performed by the Principal Investigator or an approved Field Agent or Field Monitor (see section IV.C., Types of Field Personnel for descriptions of these individuals) as authorized under a Paleontological Resource Use Permit, or by a BLM Regional Paleontologist or qualified BLM designee. Field surveys and collections performed as a mitigation measure are not intended to be scientific research studies, but are meant to identify, avoid, or recover paleontological resources to prevent damage or destruction from project activities. However, proper scientific techniques and procedures must be utilized during all mitigation efforts.

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Safety should be an important consideration; therefore, surveys should not be attempted on cliff faces, in open, non-reinforced trenches deeper than five feet, or other unsafe areas.

1. The scope of the survey is dependent upon the scale of the project. Small projects are defined as less than 10 acres, or, if linear, less than five miles; large projects exceed those dimensions.
2. At the start of field work, the consulting paleontologist (paleontologist) must contact the Paleontology Coordinator in each affected Field Office who may require a visit to that office. After an initial visit each year, the paleontologist may contact the Field Office by telephone or email prior to subsequent field trips, at the discretion of the Field Office. Information about the survey schedule, additional personnel, emergency field contact information, and any other pertinent data should be provided to the Paleontology Coordinator. The Field Office will inform the paleontologist of any conditions that may impact the survey, such as fire danger or restrictions, drought restrictions, wildlife timing restrictions, management restrictions, road restrictions or construction, and any other relevant information.
3. During the field survey, the paleontologist surveys, locates, and documents all paleontological resources within 200 feet of the proposed project location or corridor, or less distance upon approval.
  - (a) Where significant paleontological resources are at risk, data collection alone does not constitute mitigation of damage. All significant fossils that may be damaged or destroyed during project activities must be collected, along with all relevant contextual and locational data. Specimens must be collected during the survey or prior to commencement of any surface-disturbing activities.
  - (b) In many cases, isolated gar scales, chelonid (turtle) carapace or plastron fragments, crocodile and fish teeth, and unidentifiable bone fragments do not need to be collected. The location must be recorded and a description of the fossil material noted in the field notes and on a BLM Locality Form as part of the report. The context of these types of fossils should be considered, as they may represent rare occurrences or unusual faunal associations, and thus may be scientifically important and must be documented and voucher specimens collected where appropriate.
  - (c) Occurrences of plant or invertebrate fossils should be recorded and representative examples or voucher specimens collected where appropriate. Additional mitigation measures may be appropriate in some cases for these types of localities.
  - (d) If a large specimen or a concentration of significant fossils is located during the field survey, the available time and/or personnel may not allow for full recovery during the survey. The specimen(s) and locality(ies) should be stabilized as needed, and a determination made as to whether avoidance is necessary or whether full recovery of the specimen is required at a later time prior to disturbance activities. The Authorized Officer and project proponent must be notified, the mitigation alternatives discussed including funding for recovery, and a decision reached as soon as possible. If avoidance or later recovery is selected for mitigation, the find should be stabilized, buried if needed to protect the fossils and context, and appropriate measures implemented to reduce adverse effects from natural or human causes.
4. During the survey, locations or areas that exhibit a lithology suggesting a high probability of subsurface fossil material must be recorded, and a recommendation for the need for on-site monitoring, spot-checking, or testing should be made in the report. This may include areas where no fossil material was found on the surface during the survey. The recommendation

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should consider the size and type of planned disturbance, such as the depth of a trenching operation or the acreage of surface disturbance.

5. Surveys must be performed only during times when the ground is visible and not frozen. This will often preclude surveys during winter months in many areas. Biological timing restrictions, such as critical nesting or birthing times, may confine or delay field activities. Project proponents should be informed of BLM's requirement for performing any field surveys as soon as possible and should be advised of the possibilities for delays in survey completion based on seasonal weather conditions or other management restrictions to allow for adequate scheduling of available time.

**C. Report of Survey Findings.** After completion of the field survey, the paleontologist must file a written report with the BLM and the designated repository. If required, a copy should also be filed with the project proponent. This report must summarize the results of the survey as well as appropriate geological and paleontological background information as described below. It should also include any recommendations for on-site monitoring or other mitigation. For small projects (less than 10 acres), the report must be filed within 30 days after completion of the survey unless specific approval for a different time frame has been received from the BLM. The time frame for submission of the report for large projects should be negotiated during project scoping. On a case-by-case basis, approval to begin project activities may be granted for those portions of the project area noted to be less paleontologically sensitive prior to final approval of the report.

1. Reports of the general findings and the background information must be submitted to the BLM project manager or Authorized Officer (if appropriate), the Paleontology Lead or Regional Paleontologist, and each affected Field Office. Reports must include the following details, as applicable. Items (a) and (b) should appear at the beginning of the report and may be presented as a title page in multi-page reports. Some of these categories may be combined.
  - (a) Name, affiliation, address, date of report, and permit number (if consultant) of paleontologist doing the survey.
  - (b) Project name and number (if used), name of proponent, and general location of project.
  - (c) Date(s) of survey and names of any personnel assisting with the survey.
  - (d) Brief description of the proposed project, emphasizing potential impacts to paleontological resources.
  - (e) Description of background research conducted. (Include overview of known paleontological information, institutions consulted, previous surveys in the area, previous projects of similar nature in the area, and general description of survey techniques employed).
  - (f) Summary of regional and local geology. May reference earlier projects for relevant information.
  - (g) Summary of regional and local paleontology. May reference earlier projects for relevant information.
  - (h) Summary of the survey results.
  - (i) Significance of findings.
  - (j) Potential impacts to paleontological resources resulting from the project.
  - (k) Detailed mitigation recommendations that may lessen potential adverse impacts.
  - (l) Potential fossiliferous areas to allow for future assessment of sites if applicable.
  - (m) Cited and other pertinent references.

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- (n) Map of project area, indicating areas surveyed, known localities, and new discoveries.
  - (o) Relevant photos, diagrams, tables to aid in explaining, clarifying, or understanding the findings.
  - (p) Listing of collected material, including field numbers, field identifications, and elements, cross-referenced to locality field numbers. This list may be submitted in electronic format, preferably in spreadsheet format.
  - (q) BLM locality form (8270-3) or equivalent for each new locality (including localities where fossils were observed but not collected) with a 1:24000 scale map showing the localities (not reduced in scale during photocopying) (see items 2 and 3 below).
2. Exact locations of fossil localities contained in these reports are considered sensitive and must not be included in any public document. The BLM locality form (8270-3) or equivalent, 1:24000 scale map showing the localities, and any other information containing specific fossil locations may be bound separately or placed in a separate section to allow for preservation of confidential locality data. A copy of this confidential section must be submitted to the Paleontology Lead (in some cases, two copies may be required). A copy for each affected Field Office may be required. Another copy must be submitted to the official repository with the collected materials.
  3. BLM GPS recording and data standards must be used to report paleontological locality data. Existing USGS topographic maps are often based on the NAD27 standard, so locality data calculated from a map base must be converted before submission. Data must be recorded and reported with a mean error of +/- 12.5 meters or less, at a 95 percent confidence level. For small localities, data should be reported as point data. Larger polygonal localities should be reported using coordinates of a centroid and a description of the approximate size, or the key coordinate points of a bounding polygon. Linear features, such as roads or surveyed project boundaries, must be reported as line data. The 1:24000 scale map(s) accompanying the locality forms should graphically illustrate the locality, either as a point or an outline of the locality as appropriate, and be clearly labeled with the locality or field number.

**D. Report Approval.** The Authorized Officer will analyze the Survey Report for adequacy within 10 working days of receipt. Notification accepting the report, or explaining any identified deficiencies, will be sent to the consulting paleontologist and the project proponent with a copy placed in the project file. Any deficiencies must be corrected as soon as possible, usually initiated within five working days, and the report must be resubmitted for approval. Any resubmissions must be prompt, but consideration will be made for the amount of time needed for major corrections. Deficiencies directly affecting the survey, such as inadequate survey procedures or incomplete data, must be corrected before granting approval for the project to proceed. Deficiencies not directly affecting the survey, such as curation issues, will not prevent approval of the project, but must be corrected as soon as possible.

### III. Determination of Further Mitigation Requirements

The need for additional mitigation to protect paleontological resources will be determined on a case-by-case basis. The Authorized Officer, in consultation with Regional Paleontologist or the Paleontology Lead, will analyze the Survey Report for survey findings and any mitigation recommendations. If no further mitigation is needed, the Authorized Officer will promptly notify the project proponent that there are no additional paleontological surveys or mitigation measures required, and the project may proceed pending any other approvals. The project file must be documented indicating acceptance of the survey report and identifying any additional mitigation

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requirements. If it is determined that additional mitigation efforts are needed to protect or preserve the paleontological resources, the project proponent will be notified as soon as possible. The Authorized Officer and/or the Paleontology Lead usually develop and approve the mitigation procedures or recommend a project be redesigned in consultation with the project proponent. Factors such as locality or specimen significance, economics, safety, and project urgency will be considered when developing mitigation measures. Additional mitigation measures will be developed and implemented as timely as possible so as not to delay project actions.

**A. Relocation.** The preferred mitigation technique is to change the project location based on the results of the field survey. Relocation, however, may necessitate a field survey of the new area, as well as resurveys by other resource specialists. Anticipation of this contingency prior to or during the original survey may allow for survey of an expanded area at the same time. If relocation will eliminate impacts and is acceptable to all parties, then a report to the file, including a map showing the original and revised locations, must be completed documenting the change. Approval for the project to proceed in the revised location may then be granted by the Authorized Officer to the project proponent. When avoidance is not possible, appropriate mitigation may include excavation or collection (data recovery), stabilization, monitoring, protective barriers and signs, or other physical and administrative protection measures.

**B. Deferred Fossil Collection.** In some cases, fossil material may have been identified, but not completely collected during the initial field survey, such as a partial dinosaur or other large fossil assemblage. It may be possible to complete the recovery of this material and all related data prior to beginning construction activities, and thus mitigate the adverse impact. This may require a shift in the project schedule and must be coordinated with the project proponent. Approval by the Authorized Officer for the project to proceed will only be granted when recovery of the fossil material and field data is completed. A report to the file and the project proponent documenting the recovery and indicating that no further mitigation is required must be completed, and the report signed by the Authorized Officer. If the discovery cannot be fully collected within the available time frame, it may have to be avoided by relocating or redesigning the project.

### IV. Procedures for Field Monitoring

The purpose of on-site monitoring is to assess and collect any previously unknown fossil material uncovered during the project activities or soon after surface-disturbing actions. Based on the initial scoping, the field survey and recommendations, and the plan of operations, it may be necessary to require monitoring of surface-disturbing activities. Monitoring may be required as part of an overall mitigation for a project which was developed during the NEPA process, or upon the discovery of paleontological resources during project activities.

**A. Monitoring Plan.** A monitoring plan can be developed by a BLM paleontologist or a qualified paleontologist hired by the proponent. The plan must be appropriately scaled to the size and complexity of the anticipated monitoring. If developed by a third party, the appropriate Paleontology Lead or Regional Paleontologist shall review the plan for sufficiency prior to acceptance. Monitoring of the project may proceed when the monitoring plan is approved by the Authorized Officer. A monitoring plan indicates the treatments recommended for the area of the proposed disturbance and must minimally address the following:

1. The recommended approach to additional specimen collection, such as total or partial recovery or sampling; and
2. The specific locations and intensity of monitoring or sampling recommended for each geologic unit, stratigraphic layer, or area impacted.

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3. Monitoring intensity is determined based on the analysis of existing data and/or field surveys and any previous monitoring efforts.

**B. Types of Monitoring.** There are two types of monitoring: 1) on-site, performed during ongoing operations, and 2) spot-checks, performed during or after disturbance, or at key times during the progress of the project.

1. On-site monitoring – In areas with a high probability for buried fossils, the presence of a monitor at the site of disturbance at all times that disturbance is occurring may be warranted. The need for a full-time monitor is based on the findings of the survey, the local geology, and the proposed actions. Efforts will be made to complete fossil recovery with minimal work stoppage. However, in some cases, an extended period of work stoppage may be required, so coordination with the project proponent or representative is important (see D below). Prior to beginning the monitoring work, the monitor, company supervisor, and machinery operators should agree on procedures for brief work stoppages to allow for examination of finds. It is critical that safety be of utmost concern because of the presence of heavy machinery and open trenches.
1. The monitor must assess any finds, collect loose fossil material and related data, and take appropriate steps to mitigate any current or potential damage. Consideration of the size of the expected fossils must also be considered; for example, microfossils may not be visible during excavation activities. It may be appropriate to collect samples of matrix for later recovery of microvertebrate fossils or other analyses. Activities planned to occur during night time should be assessed relative to the potential to uncover significant fossils. Fossils may not be visible at night in trenching or grading operations, so construction activities may need to be suspended during night time in sensitive areas.
2. Spot-checking – In areas with a moderate to high probability for unknown fossil material, it may be more appropriate to check only at key times rather than maintain continuous monitoring of operations. Key times for scheduling spot-checking are when the fossil-bearing bedrock is exposed to view or prior to placing spoil material back into the excavation. Examples of these key times may be when a pipeline trenching operation is complete but before pipe is placed and the trench backfilled or prior to redistribution of topsoil. Spot-checking requires close coordination with the project proponent and the paleontologist, and usually requires the paleontologist to be available on short notice. In some instances, it may be advantageous to allow rain and/or wind to erode away loose matrix and concentrate fossil material to increase visibility. The paleontologist will coordinate with the project proponent to allow sufficient time for this action to occur, as appropriate to conditions, expected fossil material, and construction schedules.
3. The paleontologist should report potentially fossiliferous areas in the final report to allow for future assessment of sites, even if no fossils were located during the project monitoring.

**C. Types of Field Personnel.** Depending on the complexity of the project, it may be necessary to employ a number of paleontology field personnel simultaneously. There may be a lack of fully qualified paleontologists to perform all the necessary monitoring during the scheduled times of construction. Use of additional personnel for field work is permissible, but Field Agents and Field Monitors (described below) must be requested by the Permittee and authorized by the BLM prior to field work.

1. **Principal Investigator** – The person listed as Permittee (Permit item 1a) on the Paleontological Resources Use Permit is the Principal Investigator (PI) and is responsible for all actions under the permit, for meeting all permit terms and conditions, and for the

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performance of all other personnel. This person is also the contact person for the project proponent and the BLM.

2. **Field Agent** – Other qualified paleontologists may perform field work independently of the PI under the conditions of this permit. Résumés must be submitted to BLM and must demonstrate qualifications equivalent to those of Permittees. Field Agents must be listed on the permit under “Name(s) of individual(s) responsible for planning, supervising, and carrying out fieldwork” (Permit item 8) or authorized in a separate letter from BLM. They must follow all the permit terms and conditions applicable to field work and must carry a copy of the permit, included terms and conditions, and separate authorizing letter (if used) while in the field. Field work results must be reported to the PI, who will then submit required reports.
3. **Field Monitor** – Field Monitors may be utilized for supplemental on-site monitoring of surface-disturbing activities when the PI or a Field Agent is performing field work elsewhere. Field Monitors must have sufficient field experience to demonstrate acceptable knowledge of fossil identification, collection methods, and paleontological techniques. The PI must supply a summary of each person’s experience to the BLM prior to field work. Field Monitors must be approved by the BLM prior to performing field work and must carry a copy of the permit while in the field. The PI or Field Agent must be in communication with the Field Monitor using a portable communication device, such as a cell phone or two-way radio, and are required to be near enough to the Field Monitor to allow for prompt examination of all fossil discoveries (no more than two hours away) by the PI or Field Agent.
4. **Field Assistant** – Additional personnel not meeting the previously cited experience or knowledge levels may be utilized during field work, but must be under direct, on-site supervision of either the PI or a Field Agent as part of a supervised crew. Field assistants must have at least four to eight hours of training or experience received from a qualified paleontologist in identifying paleontological resources prior to performing field work or when first utilized in this capacity. A listing of all Field Assistants (including contact information) must be supplied prior to any field work. All discoveries made by a Field Assistant must be immediately reported to the PI or Field Agent on site. To ensure proper supervision, an appropriate ratio of Field Assistants per PI or Field Agent must be maintained. The complexity of the project, the area to be covered, and the experience of the assistants are some of the factors that should be considered in determining the proper ratio, but commonly five to seven assistants is the maximum number that can be supervised by one PI or Field Agent.

**D. Work Stoppage.** If significant fossil material is discovered during construction activities, the PI, Field Agents, and Field Monitors have the authority to temporarily halt surface disturbing actions until an assessment of the find is completed and appropriate protection measures taken. Efforts will be made to complete fossil recovery with minimal work stoppage. However, in some cases, an extended period of work stoppage may be required. If the paleontological resource can be avoided, mitigated, or collected within approximately two hours, work may resume after approval from the PI or Field Agent, and the Authorized Officer must be notified as soon as possible of the discovery and any mitigation efforts that were undertaken. If the find cannot be mitigated within a reasonable time (two hours), the concurrence of the Authorized Officer or official representative for a longer work stoppage must be obtained. Work may not resume until approval is granted from both the PI or Agent and the Authorized Officer.

## **V. Final Project Report**

Upon completion of all field work, including survey and monitoring, the PI must submit within 30 days, a written final report to the Authorized Officer, Paleontology Lead, and the designated repository. A copy of the report may be provided to the project proponent if required, but without the BLM Locality forms. Reports must include the following details. Items 1 and 2 should appear at the beginning of the report, and may be presented as a title page in multi-page reports.

1. Name, affiliation, address, date of report, and permit number (if consultant) of the paleontologist doing the survey.
2. Project name and number (if used), name of proponent, and general location of project.
3. Date(s) of the survey and names of any personnel assisting with the survey.
4. Brief description of project and expected impacts to paleontological resources.
5. A summary of mitigation performed.
6. A summary of findings, including important discoveries.
7. A description of potentially fossiliferous areas to allow for future assessment of sites, even if no fossils were located during the project monitoring.
8. A completed BLM locality form 8270-3 or equivalent for each new locality using Universal Transverse Mercator (UTM) NAD 83 coordinates, and 1:24000 scale maps with new localities plotted using points or polygons as appropriate. Locality forms, maps, and any other information containing specific fossil locations should be bound separately or assembled as a separate section to allow for preservation of confidential locality data.
9. List of specimen field numbers and field identifications of collected material, cross-referenced to the locality field number. This list may be submitted in electronic format, preferably in a spreadsheet format.

If the survey was performed by BLM, a report similar in contents must be written and filed in the project file, and the project proponent notified as soon as possible upon completion.

## **VI. Completion of Mitigation Responsibility**

When the final report with the specimen inventory and the signed receipt of confirmation of museum deposition are accepted by the BLM, mitigation for paleontological resources related to the project will be considered completed. The project proponent will be notified in writing as soon as possible by the Authorized Officer after consulting with the Paleontology Lead or Regional Paleontologist and a copy of the notification placed in the project file.

The responsibility of the project proponent ends when appropriate mitigation related directly to the project is completed and final approval is received from the Authorized Officer. Any additional field collection, quarrying, final specimen preparation, etc. will be considered to be research, and will be the responsibility of the consulting paleontologist or another approved party. The project proponent will not be held responsible for completion of any research project. However, the project proponent can choose to sponsor further research. A separate research permit will be required for additional research activities.

## **VII. Collections Resulting from Assessment and Mitigation**

Fossil specimens and related data collected from public lands during field surveys and mitigation remain the property of the Federal government. They must be placed in the approved repository(s)



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identified on the Paleontological Resource Use Permit held by the consulting paleontologist as soon as practical and receipt(s) of collections submitted to the BLM, but no later than 60 days after all field work is completed. Written approval from the Paleontology Lead or Regional Paleontologist is required if additional time is needed for transfer of all specimens and field data.

### **VIII. Resource Management Updates**

Based on findings resulting from any of the above steps, the project file, locality and specimen information, and other BLM data should be updated to reflect any new or modified information. Paleontology permit files should be checked and updated, as well as any other administrative information.

The PFYC Class assignments can be assessed based on the analysis, survey, and monitoring results. New information may indicate a change in the PFYC Class is appropriate for one or several geologic units. Other applications of the PFYC system should be considered, such as the use for impact analyses in planning documents or for survey and mitigation determinations for other projects. Any changes in classification must be made in consultation with the Paleontology Lead or Regional Paleontologist to maintain consistency across Field Office boundaries.

## Appendix A to Attachment 1 – Definitions

(As applicable to BLM management of paleontological resources)

**Alluvium** – A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material [fragments of rock or mineral material derived from older rocks] deposited during relatively recent geologic time by a stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or its flood plain or delta, or as a cone or fan at the base of a mountain slope; especially, such a deposit of fine-grained texture (silt or silty clay) deposited during a time of flood (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.)

Alluvium may contain paleontological resources in older alluvial deposits. The location on the landscape often will provide clues to the potential for paleontological resources within alluvial deposits. As an example, alluvium developed near major river courses or lake margins has a much higher potential to contain significant paleontological resources than alluvium (colluvium) formed from slope wash.

**Approved Repository** – Meets the Department of the Interior 411 Departmental Manual (DM) provisions for museum property, including capability for providing adequate long-term curatorial services, such as a physically secure environment, and maintaining professional staff qualified to catalog, care for, preserve, retrieve, and loan, where appropriate, these materials and associated records.

**Bedrock** – A general term for the rock, usually solid, that underlies soil or other unconsolidated, surficial material (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.) For paleontological purposes, bedrock generally excludes alluvium, colluvium, sand dunes, and loess (fine-grained blanket deposit of marl or loam). In certain situations, bedrock may contain recent soils/sediments with fossils.

**Colluvium** – A general term applied to any loose, heterogeneous, and incoherent mass of soil material or rock fragments deposited chiefly by mass-wasting, usually at the base of a steep slope or cliff; e.g., talus, cliff debris, and avalanche material. Also, alluvium deposited by unconcentrated surface run-off or sheet erosion, usually at the base of a slope (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.)

**Field Agent** – Other qualified paleontologists may perform field work independently of the PI under the conditions of this permit. Résumés must be submitted to BLM and must demonstrate qualifications equivalent to those of Permittees. Field Agents must be listed on the permit under “Name(s) of individual(s) responsible for planning, supervising, and carrying out fieldwork” (Permit item 8) or authorized in a separate letter from BLM. They must follow all the permit terms and conditions applicable to field work and must carry a copy of the permit, included terms and conditions, and separate authorizing letter (if used) while in the field. Field work results must be reported to the PI, who will then submit required reports.

**Field Assistant** – Additional personnel not meeting the previously cited experience or knowledge levels may be utilized during field work, but must be under direct, on-site supervision of either the PI or a Field Agent as part of a supervised crew. Field assistants must have at least 4 to 8 hours of training or experience received from a qualified paleontologist in identifying paleontological resources prior to performing field work or when first utilized in this capacity. A listing of all Field Assistants (including contact information) must be supplied prior to any field work. All discoveries made by a Field Assistant must be immediately

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reported to the PI or Field Agent on site. To ensure proper supervision, an appropriate ratio of Field Assistants per PI or Field Agent must be maintained. The complexity of the project, the area to be covered, and the experience of the assistants are some of the factors that should be considered in determining the proper ratio, but commonly five to seven assistants is the maximum number that can be supervised by one PI or Field Agent.

**Field Monitor** – Field Monitors may be utilized for supplemental on-site monitoring of surface-disturbing activities when the PI or a Field Agent is performing field work elsewhere. Field Monitors must have sufficient field experience to demonstrate acceptable knowledge of fossil identification, collection methods, and paleontological techniques. The PI must supply a summary of each person's experience to the BLM prior to field work. Field Monitors must be approved by BLM prior to performing field work and must carry a copy of the permit while in the field. The PI or Field Agent must be in communication with the Field Monitor using a portable communication device, such as a cell phone or two-way radio, and are required to be near enough to the Field Monitor to allow for prompt examination of all fossil discoveries (no more than two hours) by the PI or Field Agent.

**Field Survey** – Pedestrian (walking) surveys performed in areas where significant fossils are expected to occur within the boundary or immediate vicinity of an anticipated disturbance. Surveys are performed by a qualified paleontologist or BLM Regional Paleontologist or other officially appointed BLM employee prior to any surface disturbing activities. Survey activities also include concurrent collection of significant fossils.

**Land Tenure Adjustments/Change in Title** – Changes in ownership or administration of surface or mineral estates, typically exchanges or sales, which may result in a change in ownership or control of paleontological resources.

**Monitoring** – a) On-site observation during all surface disturbing activities to assess and collect any previously-unknown fossil material uncovered by the project activities. b) Examination of excavation or spoil piles at key times during project activities. Monitoring must be performed by a permitted paleontologist, field agent, or field monitor (see section *IV.C.*), Regional Paleontologist, or other officially appointed BLM employee, and occurs during or soon after surface disturbing actions.

**Paleontological Locality (Locality)** – A geographic point or area where a fossil or associated fossils are found in a related geological context. A paleontological locality is confined to a discrete stratigraphic layer, structural feature, or physiographic area.

**Paleontology Program Coordinator (Paleontology Coordinator)** – The employee designated by the local BLM Office Manager to manage paleontological resource issues, including planning, mitigation, budget, and other administrative duties. The local point of contact for paleontological resource use permittees, the State Office Paleontology Program Lead, and the Regional Paleontologist. The employee is usually a geologist or archaeologist.

- (a) In some offices, additional employees may be designated by the supervisor to determine the need for field surveys and monitoring for some projects, or other duties in support of the paleontology program. The scope of duties for these additional employees must be approved by the Paleontology Program Lead and closely coordinated with the Paleontology Coordinator.
- (b) A few current BLM employees may meet the same professional qualifications that are required for a BLM Paleontological Resources Use Permit applicant. BLM-approved training and field experience may also allow employees to gain sufficient background to

## APPENDIX D—PALEONTOLOGICAL RESOURCES PROGRAM GUIDANCE

achieve competency in the field. With the approval of the Regional Paleontologist and the Office Manager or Deputy State Director, these employees may be designated as qualified to perform field surveys or monitoring. The current availability of these employees must also be approved by the unit manager or Deputy State Director, typically on a project-by-project basis or within a defined time period. Depending on official duties, local roles and responsibilities, and management preferences, these employees may or may not be the Paleontology Coordinator.

**Paleontology Program Lead (Paleontology Lead)** – Any one of the following: the Regional Paleontologist in the states with an identified position; the paleontologist at Grand Staircase-Escalante National Monument; or the State Office Archeologist in the states without a Regional Paleontologist.

**Principal Investigator** – The person listed as Permittee (Permit item 1a) on the Paleontological Resources Use Permit is the Principal Investigator (PI) and is responsible for all actions under the permit, for meeting all permit terms and conditions, and for the performance of all other personnel. This person is also the contact person for the project proponent and the BLM.

**Regional Paleontologist** – The BLM paleontologist that provides professional expertise in paleontology, and is responsible for interpreting relevant laws, authorities, and policy for the administration of the BLM paleontology program for all States in his/her respective region, and as the program interface between Field and/or District Offices, State Offices, and the Washington Office. In some cases, the Regional Paleontologist also serves as the State Office Paleontologist.

**Significant Paleontological Resource** (syn. **Significant Fossil Resource**) – Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities.

**Soil** – The natural medium for growth of land plants (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.) Generally, well-developed soils do not contain paleontological resources. However, the C horizon (the substratum above bedrock that is little affected by soil forming processes) may occasionally contain Pleistocene-aged fossils.

**Stipulations** – Written conditions that may restrict or impose limits on approved activities, or require that certain procedures be followed. The general usage herein encompasses several formal terms specific to other use authorizations such as Mitigation, Terms and Conditions, Conditions of Approval, and Standard Stipulations.

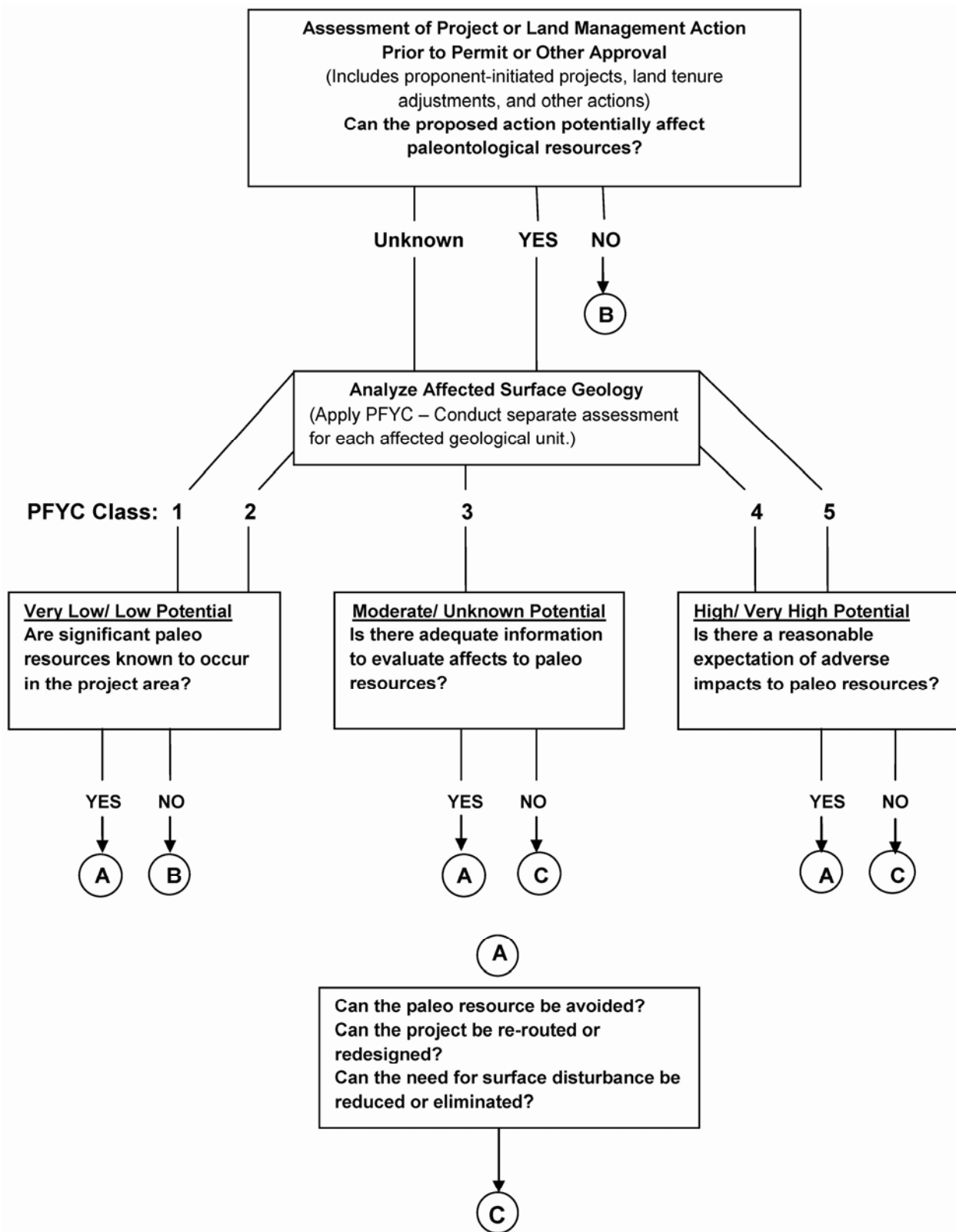
**Surface disturbance** – Disruption of the ground surface and subsurface. Disruption may damage or destroy significant paleontological resources and their geological context.

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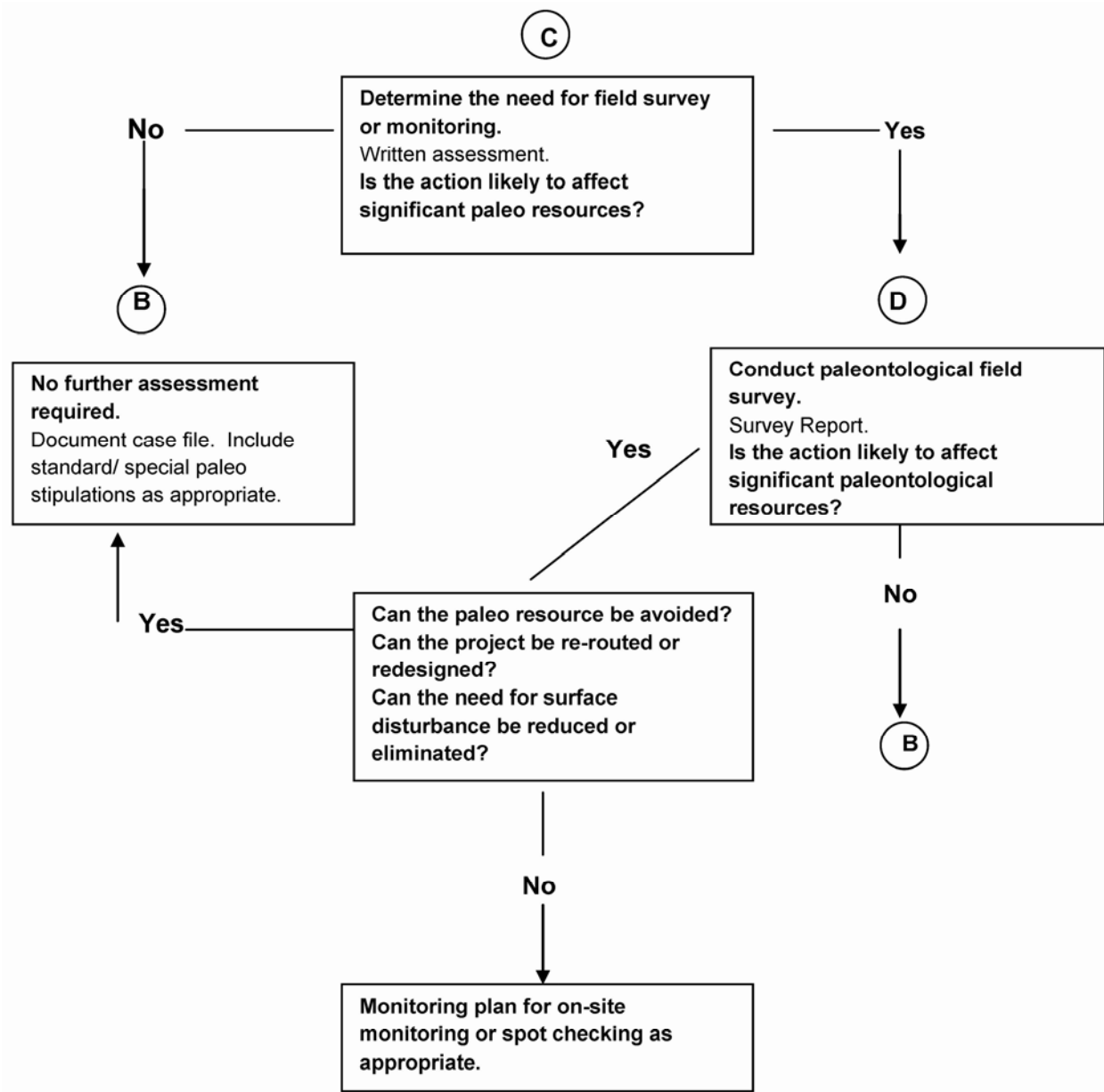
- Generally excludes: fire (but not fire activities, see below), vegetation mowing, weed spraying, grazing, natural erosion, fence building
- Some activities that may impact the ground surface and must be assessed on a case-by-case basis are:
  - Mechanized vegetative treatments – chaining, sagebrush chopping, etc
  - Seismic activities – vibroseis techniques, cross-country travel
  - Fire management activities – line building, brush removal and thinning using mechanized equipment
  - Recreational activities – OHV, rock collecting, mountain biking, public events

**Voucher Specimen** – A representative sample that verifies the kind of fossil material found during a field survey, and is collected and curated in an approved repository along with its associated field data.

**Attachment 2.**  
**Paleontological Resources Assessment Flowchart**



Paleontological Actions



## APPENDIX E: RECLAMATION GUIDANCE

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## APPENDIX E—RECLAMATION GUIDANCE

### INTRODUCTION

This appendix was developed to provide a comprehensive source for the pertinent guidance and requirements of the BLM for the reclamation of surface disturbance in the CD-C project area. The documents in this appendix can be used by CD-C Operators to develop reclamation plans for their proposed development that would meet the requirements of the BLM and lead to restoration of disturbed sites on public lands.

The documents in this appendix include:

- **Appendix 36 to the Rawlins RMP.** This document lays out the basic requirements for reclamation of surface disturbance in the RFO. The RMP was published in December 2008 and Appendix 36 has been in use since that time. It provides information needed to develop a reclamation plan and to prepare monitoring reports and explains the criteria for final reclamation success, including: establishment of eighty percent of pre-disturbance ground cover; 90 percent dominant species; no noxious weeds; and erosion features equal to or less than surrounding area.
- **High Desert District Policy for Reclamation of Disturbed Lands.** The district policy formally adopts and implements the Wyoming BLM State Reclamation Policy (IM WY-2012-032). Additionally, it underlines the importance of on-the-ground reclamation success and cautions against requiring more reclamation planning information than is necessary.
- **Wyoming BLM State Reclamation Policy, IM WY-2012-032 and attachments.** This document identifies ten requirements that must be addressed when developing reclamation proposals for all surface-disturbing activities on public lands in Wyoming. They are:
  1. Manage all waste materials.
  2. Ensure subsurface integrity, and eliminate sources of ground and surface water contamination.
  3. Re-establish slope stability, surface stability, and desired topographic diversity.
  4. Reconstruct and stabilize water courses and drainage features.
  5. Maintain the biological, chemical, and physical integrity of the topsoil and subsoil.
  6. Prepare site for revegetation.
  7. Establish desired self-perpetuating native plant community.
  8. Reestablish a complementary visual composition.
  9. Manage invasive plants.
  10. Develop and implement a reclamation monitoring and reporting strategy.
- **Proposed Interim Rollover Objective for the Continental Divide-Creston Natural Gas Project Environmental Impact Statement and Record of Decision (February 25, 2011).** This document was developed by the CD-C Reclamation Work Group, an ad hoc group focused on improving reclamation in the CD-C project area. The document was intended to provide flexibility for industry, while maintaining healthy, desirable vegetation within the project area. The group, including representatives of industry, state agencies, the University of Wyoming, local governments, and the BLM, worked for two years to develop the document. The document provided the framework in which the *BLM Rollover Criteria, Continental Divide–Creston Draft EIS* (description follows) was developed.
- **BLM Rollover Criteria, Continental Divide–Creston Draft EIS.** The criteria described in this document are formally incorporated as an element of *Alternative C: Surface Disturbance Cap—High and Low Density Development Areas*. For the purposes of the CD-C EIS, the standards and guidance contained in the Rawlins RMP Appendix 36 and the Wyoming State Reclamation Policy, IM-WY-2012-032, apply to the Proposed Action and the other action alternatives. However, a specific

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exception is made with regard to *rollover* credits involved with *Alternative C*. *Rollover* credits exist in the context of a cap on the amount of surface disturbance generated by natural gas development. They refer to the process by which acreage that counted against a surface disturbance cap when natural gas facilities were initially constructed could be successfully reclaimed and *rolled over*, meaning counted again as undisturbed acreage. When a natural gas well pad and its associated road and pipeline are constructed, the initial disturbance is much larger than what is needed for the long term. After the well has been completed, the area that was initially disturbed but is no longer needed, perhaps 60 percent of the total, undergoes *interim reclamation*.<sup>1</sup> With a surface disturbance cap in place, this portion of the initial disturbance acreage can be *rolled over* when the BLM determines that it has been successfully reclaimed.

In some cases, for example in the neighboring Atlantic Rim Natural Gas Project, the success criteria applied for rollover credits are the same as the final reclamation standard, in other words, the RMP Appendix 36 performance criteria: establishment of 80 percent of pre-disturbance ground cover; 90 percent dominant species; no noxious weeds; and erosion features equal to or less than surrounding area. For the CD-C Alternative C, however, the RFO has defined *Reclamation Rollover Criteria* as follows:

- The area is re-vegetated with a stable, approved plant community;
- Vegetative cover is sufficient to maintain a healthy, biologically active topsoil;
- Erosion is controlled;
- Habitat, visual and forage loss is minimized; and
- No noxious weeds are present.

There is no requirement that pre-disturbance ground cover or the dominant species match a specified percentage. Once these criteria have been satisfied in the judgment of the RFO, the affected acreage would be *rolled over* and the cap would increased by that amount.

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<sup>1</sup> As defined in IM WYD- 03-2011-02, “*interim reclamation* is used to restore vegetation, and scenic and habitat resources while a well continues to produce energy. With interim reclamation, all areas not needed for the production of oil and gas are reclaimed, that is, reshaped, covered with topsoil, and reseeded with native plants. Interim reclamation also refers to the stabilization of soil by revegetation on sites that will likely be further disturbed in the future. This includes sites where recontouring is needed where periodic disturbance may occur due to operation and maintenance activities.” *Interim reclamation* can be contrasted with *final reclamation*, which is “reclamation of an area that is not planned for further disturbance including recontouring, stabilization of soil by revegetation and restoring the ecosystem function originally found at the site.” It normally occurs after a well is plugged and abandoned.

## Appendix 36, Rawlins RMP

Reclamation of public land will be required for any surface-disturbing activity. A reclamation plan appropriate in detail and complexity, and tailored to a specific surface-disturbing activity, will be required and made a condition of approval of any action. This appendix details the elements that need to be considered during pre-disturbance authorization of any surface disturbance and the post-disturbance steps required to assure timely and proper recovery of the site.

The reclamation plan will provide a framework to develop project-specific and site-specific reclamation actions and guide land management efforts toward a planned future condition for any surface disturbance. Early coordination between the Bureau of Land Management (BLM) and project proponents is necessary to produce a comprehensive plan. The reclamation plan will serve as a binding agreement between project proponents and BLM for the expected reclamation condition of the disturbed lands and must be periodically reviewed and modified as necessary. The reclamation plan will include sufficient monitoring requirements, reports, and components to ensure the reclamation plan is current.

Although the proponent will usually develop the reclamation plan, appropriate BLM involvement in preplanning, data inventory, and approval is essential to develop the optimum reclamation proposal. Most determinations regarding what is expected should be made before the reclamation plan is approved and implemented. However, any plan can be modified to adjust to changing conditions or to correct for an oversight. An approved reclamation plan and reporting obligations will be required prior to any surface-disturbing activity. A reclamation plan should provide the following:

- A logical sequence of steps for completing the reclamation process
- The specifics of how reclamation standards will be achieved
- An estimate of specific costs of reclamation
- Sufficient information for the development of a basis of inspection and enforcement of reclamation and criteria to be used to evaluate reclamation success and reclamation bond release
- Sufficient information to determine whether the reclamation plan is in conformance with the applicable BLM land-use and activity plans, as appropriate. Further guidance for reclamation can be found in the BLM/Forest Service Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (Gold Book), fourth edition, 2006, at [http://www.blm.gov/bmp/gold\\_percent20book/FinalGoldBook\\_percent20-percent202006\\_percent20Edition.pdf](http://www.blm.gov/bmp/gold_percent20book/FinalGoldBook_percent20-percent202006_percent20Edition.pdf).

In preparing and reviewing reclamation plans, BLM and the project proponent must set reasonable, achievable, and measurable reclamation goals that are not inconsistent with the established land-use plans. Achievable goals will ensure reclamation and encourage operators to conduct research on different aspects of reclamation for different environments. These goals should be based on available information and techniques, should offer incentives to both parties, and should, as a result, generate useful information for future use.

The purposes of the reclamation plan are as follows:

- Reclamation plans provide detailed guidelines for the reclamation process and fulfill federal, state, county, and other local agencies requirements. They can be used by regulatory agencies in their oversight roles to ensure that the reclamation measures are implemented, are appropriate for the site, and are environmentally sound.
- Reclamation plans will be used by the project proponent throughout the operational period of the project and subsequent to cessation of surface-disturbing activities. In turn, responsible agencies, including BLM, will use the reclamation plan as a basis to review and evaluate the success of the reclamation program.
- Reclamation plans should provide direction and standards to assist in monitoring and compliance evaluations.

## APPENDIX E—RECLAMATION GUIDANCE

BLM reclamation goals emphasize eventual ecosystem reconstruction that returns the land to a condition approximate to or better than that which existed before it was disturbed, by re-creating the successional pathway that restores the plant cover and species composition of the site to its pre-disturbance direction and boundaries.

Interim reclamation is an intentional activity to initiate or accelerate the recovery of an ecosystem with respect to its health, integrity, and sustainability, including quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation.

Interim reclamation measures are used to achieve this short-term goal while setting the stage for final recovery. For example, on a well pad where drilling is completed, interim reclamation would include drying and back-filling reserve pits, initial recontouring and redistribution of saved top soil, installing a rocked driveway, installing fencing as needed, and revegetating the area. Interim reclamation guidelines will be addressed on a case-by-case basis, as appropriate.

Final reclamation measures are used to achieve the recovery goal. A disturbed area has recovered—and is restored—when it contains sufficient biotic and abiotic resources to continue its development and interactions without further assistance or subsidy. It will demonstrate resilience to normal ranges of environmental stress and disturbance.

Planning efforts that consider the processes necessary for successful reclamation are important. Pre-disturbance surveys, site stabilization, weed control, and maintenance and health of soils are significant considerations. All forms of revegetation must consider vegetative succession patterns and processes. Annual monitoring and reporting is the best way to track success and implement adaptive management strategies that treat problems.

The ideal starting point for reclamation is to ensure that reclamation planning starts before disturbance and is an integral part of the operational plan. All attempts should be made to develop and implement new ideas and technologies that limit or greatly reduce the amount of land surface disturbance.

Pre-disturbance surveys provide data that allow for proper planning and timely implementation of planned activities. For instance, pre-disturbance site surveys give the operator the information to know what plant communities, composition, structure, and successional pathway to restore to and can influence the amount and type of seed that is ordered and how and where the seed is planted and handled. Pre-disturbance inventories define baseline conditions and should be followed up with annual monitoring.

Among items to be emphasized in achieving these goals are:

- Stabilization of disturbed soils
- Soil stabilization through establishment of a vegetative ground cover on disturbed sites during the first growing season following disturbance
- Restoration of the same native vegetation disturbed or removed or restoration of an alternate vegetative regime in consultation with and approval by BLM's Rawlins Field Office
- Provide vegetation and/or site characteristics to accommodate previous land uses
- Minimal disturbance of the existing environment and avoidance of riparian areas
- Annual monitoring, detection, and control of invasive and noxious weeds beginning the first season of disturbance
- Monitoring and management of reclamation sites to evaluate weed populations, reclamation success, and to plan and report on the program annually
- Positive efforts to resist the spread of weeds, including power washing of machinery and equipment between work sites consistent with the Rawlins Weed Prevention Plan (USDI, BLM 1999b).

## APPENDIX E—RECLAMATION GUIDANCE

### SOIL

Topsoil is the building block of successful reclamation. Soil consists of living organisms that must be properly cared for. Many plants rely on these organisms to facilitate the uptake of nutrients and water, especially in times of stress. To preserve and care for topsoil organisms, there are several strategies that can be employed—stockpiled soil can be immediately planted with a mix of native plant species, inoculated after being respread and planted with early successional species, or stored for short periods of time.

Topsoil should be handled separately from subsoil materials. At all construction sites, if topsoil must be stripped, project proponents must provide for sufficient quantities to be respread to a depth of at least 4 to 6 inches over the disturbed areas during reclamation. In areas where deep soils exist (such as floodplains and drainage channel terraces), at least 12 inches of topsoil should be salvaged. Where soils are shallow or where subsoil is stony, as much topsoil should be salvaged as possible. Care should also be taken to avoid mixing productive soil types with less productive soil types where two or more soil types may occur on a single site.

The salvaged soil can either be stockpiled for later use or used immediately over regraded surfaces that are ready for reclamation. The latter option, sometimes called direct or live haul, is preferable to stockpiling because the soil microbes, bacteria, viable seeds, and plants that can take root are at their most abundant, leading to better revegetation. Stockpiling soil for long periods results in the loss or elimination of these beneficial characteristics, especially when soils are stockpiled more than several feet high diminishing biological activity as a result of lack of oxygen.

Topsoil will be stockpiled separately from subsoil materials to preclude contamination or mixing, and topsoil stockpiles should be signed. When topsoil will be stored for more than 1 year, stockpiles should not exceed 2 feet in depth. They should be seeded with a prescribed seed mixture and covered with mulch to reduce erosion and discourage weed invasion. Runoff should be diverted around topsoil stockpiles to minimize erosion of topsoil materials. In most cases, disturbances will be reclaimed within 1 year. Therefore, it is unlikely that topsoil will be required to be stockpiled for more than 1 year. Salvaged topsoil from roads and project sites will be respread over cut-and-fill surfaces not actively used during the project life.

In some cases, there may be insufficient quantities of topsoil available for salvage to adequately cover the surfaces upon final reclamation and revegetation. In these cases, there is the need to find sui replacement or substitute growth media; this may include using subsoils or strata deeper within the overburden with suitable characteristics for plant growth. Deficiencies in the replacement or substitute soil could be made up by using soil amendments. See <http://www.nps.gov/plants/restore/pubs/intronatplant/planning.htm> for a good overview on the restoration process and soil needs.

### SITE PREPARATION

It is important to consider diversity in seedbed preparation to account for various seed sizes and establishment strategies of different species. Consideration should be given for seed-safe sites, water infiltration and collection, shade, and frost protection.

### RECONTOURING

Trees, shrubs, and ground cover adjacent to disturbance areas but not cleared from rights-of-way (ROW) require protection from construction damage. Recontouring to preconstruction condition as well as restoration of normal surface drainage are required.

### ROAD RECLAMATION GUIDELINES

Road reclamation guidelines are as follows:

- Determine the desired level of obliteration and reclamation. Determine whether there are alternative short- or long-term uses for roads.
- Determine short- and long-term reclamation objectives and goals. Identify the monitoring methods to determine reclamation success or failure and possible mitigation.
- Reclaim the road; the effort may include ripping and scarifying the surface, removing culverts and other flow structures, recontouring cut-and-fill slopes to provide for complete removal of the road, and total recontouring to the original topographic profile.
- Reclaim vegetation to standards outlined in the section on “criteria for reclamation.”
- Establish mitigation measures to remedy problems identified by monitoring.

### WEEDS

One of BLM’s highest priorities is to promote ecosystem health, and one of the larger obstacles to achieving this goal is the rapid expansion of weeds across public lands. Invasive plants can dominate sites and often cause long-term changes to native plant communities. If not eradicated or controlled, noxious weeds will jeopardize the success of reclamation. Invasive weeds can slow reclamation success or halt it altogether. ROW, mineral lease, mining claim, and permit holders are required to monitor and control noxious and invasive weeds on public land as stipulated within their permits and authorizations. Some recommended best management practices (BMP) for weed control are located in Appendix 31, Rawlins Field Office Noxious Weed Prevention Plan (see Proposed RMP/Final EIS).

### SEED

On all areas to be reclaimed, seed mixtures are required to be weed free and site-specific, composed of the same native species as were disturbed, or early successional species consisting of pioneer species, including seasonal or annual species (that may only be evident at certain times of the year), that will lead to a similar climax community as that disturbed. Site preparation and species choices must ensure soil stability.

A pre-disturbance species composition list must be developed for each site to ensure proper community composition, function, and structure. This will ensure that the type of vegetative community replaced is compatible with climate and soil types and should make it easier for the project proponent to successfully restore and stabilize specific sites.

Livestock palatability and wildlife habitat needs must be given consideration in seed mix formulation during reclamation within areas of important wildlife habitat (crucial winter range, sage-grouse nesting habitat, etc.); provision shall be made for the replacement of native browse and forb species. BLM guidance for native seed use is the BLM Manual 1745 and Executive Order (E.O.) 13112 (Invasive Species, 64 Code of Federal Regulations [CFR] 6183).

It is helpful to become familiar with the following terms when ordering seed to assist in making informed decisions.

#### **Certified Seed (Blue Tag)**

This certification only applies to seed produced through cultivation, not seed collected in the wild. The seed certification system promotes the production and purchase of seed of known genetic identity. Only cultivated, named varieties can be certified. A certification agency inspects field conditions and regulates how the seed is produced, harvested, and cleaned. The seed is subject to a variety of laboratory tests. This

## APPENDIX E—RECLAMATION GUIDANCE

certification process guarantees the seed has the same genetic potential to perform in the field as the original seed did when it was released for production.

### Source Identified Seed (Yellow Tag)

The Association of Official Seed Certifying Agencies (AOSCA) has an approved seed certification class for native seed collection called the “Source Identified Class.” The tag confirms to the purchaser that the location of seed harvest was verified by the certifying agency.

### Pure Live Seed

Pure live seed (PLS) is a measure describing the percentage of a quantity of seed that will germinate. It is a way to standardize quality so the purchaser can compare the quality and value of different lots of seed. One lot may be cheaper but may not have as high a PLS as another lot, and therefore may not be a better buy because fewer seeds would actually germinate.

$$\text{PLS} = \text{percent purity} * \text{percent germination rate}/100$$

$$\text{Example: } 90 \text{ percent purity} * 50 \text{ percent germination rate}/100 = 45 \text{ percent PLS}$$

### Seed Testing and Labeling

Seed Operators should include a clear label on each bag of seed that shows the results of purity and germination tests and the scientific name of the species. The Association of Official Seed Analysts oversees these tests. Purity of the seed is the percentage of the labeled species by weight. The percentages of other crop, weed, inert material, and the percentage of dormant or hard seed should also be included. The label should also show the percentage of the seed count that will germinate.

### Site Adapted Custom Seed Collection

Some seed Operators also may offer collection services that involve harvesting seed from sites that the customer specifies. This is a preferred method for many who want to ensure that their seed is from local sources.

### Seed Suppliers

Many of the considerations for choosing plant material suppliers also apply to choosing seed suppliers. Seed suppliers should operate in the same geographic ecoregion as the restoration site because that supplier is most likely to have native seed suitable for that area. Companies specialize in native seed collection, processing, and growing, and can have a wealth of knowledge about native plants and seeds. Do not rely on a single supplier for all seed needs.

### Standard Seed Mixtures—Rawlins Field Office

Care and planning must be taken to choose mixes and amounts that will benefit under site-specific conditions. Planning and thought must also go into selecting successful planting and site-preparation techniques. All sites must be planted with a diverse mix of grasses, forbs, and shrubs to be considered successful. The project proponent is ultimately responsible for successful restoration of disturbed sites. Alternate seed mixes can be submitted by the project proponent to BLM for review and approval prior to use. The final goal is to restore disturbed sites so that they closely resemble pre-disturbance native plant communities. Some standard seed mixes are available for the Rawlins Field Office and contain only native species. If the use of a non-native species is desired, documentation of the need is required by BLM policy. Non-native species may be considered for erosion and weed control. Seed mixtures consisting of sterile annual cover crops, such as tricale hybrid, can be used. The use of a non-sterile plant species such as wheat as a cover crop is not recommended because of its ability to reseed itself. Follow-

## APPENDIX E—RECLAMATION GUIDANCE

up seeding or corrective erosion control measures will be required on areas of surface disturbance that fail to meet reclamation success standards within a reasonable time.

### Mulch

Use of mulch during reclamation may enhance chances for successful vegetation reestablishment. Mulches can help control wind and water erosion, retain and collect seed, increase and prolong soil water capacity, and add organic compounds to the soil. Mulches are best applied after seeding to ensure proper seed contact with soil. Mulch may include hay, small-grain straw, wood fiber, live mulch, cotton, jute, or synthetic netting. Straw mulch should contain fibers long enough to facilitate crimping and provide the greatest cover. Take care that mulch is not more than 1 inch deep; if too deep a layer is applied, it can retard vegetation establishment.

Any mulch used must be certified free from mold, fungi, or noxious or invasive weed seeds.

### LIVE PLANTINGS

Live plants can be planted on disturbed sites and, with proper site preparation, can greatly enhance restoration efforts and shorten time frames. Operators can buy bare root and container stock directly from vendors or can contract seed collection and growth from local growers. Another strategy is to use an excavator to collect clumps of plants from the site and plant them either on reserved topsoil piles and/or on restoration sites during recontouring. These clumps can provide native seed and soil flora as well as collect precipitation and provide shade for newly emerging plants.

### Seeding and Planting Methods

There are many types and configurations of rangeland seeders, interseeders, and transplanters. Be sure to use the right tool for the job. The equipment should be set up to segregate seed by size and planting depth. The contractor should know when, where, and under what conditions to plant the appropriate species. Many forbs, shrubs, and some grasses do not compete well as young plants and should be planted with compatible species. Less aggressive, slower growing species should be planted separately from faster growing more aggressive species. Some species require companion species; there are many variables, so care must be taken in seed selection and planting technique.

Most conventional grain drills are inadequate for rangeland seeding. Their seed boxes are generally not individually suspended, and their depth regulators are usually inadequate for native species and generally plant too deep. Adequate equipment and knowledge of site-specific reclamation practices is paramount to the success of seeding objectives. Look for contractors using proven rangeland equipment and methods. For example, they should have a rangeland drill, Truax drill, land imprinter, Amazon no-till drill, broadcast seeder, Brillion-seeder, seeder-scalper, interseeders, surface seeder, hydro-seeder, scarifier, dozer, or other appropriate equipment.

Depending on site-specifics such as soil types and soil moisture, there are a number of ways to properly prepare seedbeds. It is best to prepare the seedbed early in the fall and then plant in late fall or early winter. However, when proper conditions exist, planting can occur through the winter into early spring. Planting at other times of the year will have higher chances for failure. Care should be taken not to work soils that are too wet because compaction and soil crusting can occur.

Seedbed preparation and seeding often occur simultaneously. Therefore, it is critical to choose the proper methods and timing. A good strategy for seed mixes is to leave seedbeds in a rough surface condition, then broadcast seed, followed by light chaining or harrowing. Deep furrow drilling should not be used in dry soils or in loose soils because it tends to slough and leave seeds at uneven depths and often too deep for germination. Deep furrow drilling in tighter soils may be appropriate because it can reduce soil moisture loss and shade new seedlings. Cultipacker seeders, punch drills, pitting, and some compact drills



## APPENDIX E—RECLAMATION GUIDANCE

may also be a good strategy for loose soil types, particularly if they are able to segregate seed and plant at varying depths.

Planting container or bare-root stock requires specific strategies that have been proven successful. Some methods that can be used include random hand-planting, trenching, inter-seeding, and deep-furrow planting.

It is essential to consider several options for seedbed preparation to account for soil types, pH, structure, variable seed size, planting depths, competition, and the establishment of strategies for different species. Consideration should be given for seed-safe sites, water infiltration and collection, shade, and frost protection.

### Planning and Monitoring

For each discrete site where ground disturbing activities are planned, a site-specific reclamation plan shall be prepared, submitted, and approved by BLM before the project proponent disturbs the environment. Guidance and requirements for this plan can be found in program-specific direction (USDI, BLM 1983). A project-wide reclamation plan may be considered if it addresses the individual site disturbances specifically.

With the exception of active work areas, disturbed areas anticipated to be left bare and exposed will be stabilized with at least a 50-percent cover of mulch to prevent soil erosion. Variation of the cover percentage and the use of other stabilizing materials can be proposed and used with BLM approval consistent with the relevant project-specific reclamation plan. For areas anticipated for further disturbance in the near future, use of the seed mixtures detailed in Temporary Seed Mixtures may be acceptable in the interim.

### First Growing Season

Reclamation actions will be implemented before the first growing season following disturbance with the goal of returning the land to a condition approximate to or more productive than that which existed before disturbance or to a stable and productive condition compatible with that described in the land use plan. Consistent with the reclamation plan, the operator will ensure the following during the first growing season.

Prior to the beginning of the growing season—

- Stabilize disturbed site soils until they are revegetated with no obstacles to germination and growth of seed
- Properly prepare the site by—
  - Recontouring for permanent reclamation
  - Completing soil preparation activities, such as ripping, straw crimping/seedbed preparation for planting, including drilling and broadcast methods
  - Planting the approved seedling/seed mixtures using site-specific methods for successful revegetation using regionally, and/or site-adapted genotypes
  - Ensuring that weed treatments are compatible with seed mixtures.

During the first growing season—

- Monitor germination and growth of plants in the area being reclaimed
- Detect and control weeds in all areas—not just reclaimed areas
- Use adaptive management to correct establishment and growth problems
- Put up temporary fencing to avoid adverse effects to reclamation

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- Build snow fencing, if requested, to increase effective precipitation and regenerate vegetation.

Following each growing season—

- Review and complete a site-specific vegetation monitoring report for areas being reclaimed (Table A36-1)
- Prepare a written, site-specific prescription for actions to be implemented, including—
  - Reseeding of areas not attaining reclamation success
  - Soil stabilization
  - Weed control needs
  - Mulching/fertilization or other cultural practices prescribed for the following season.

If the treatment area is found, through site-specific monitoring data, to be successfully reclaimed, monitoring to confirm reclamation success will continue for at least five seasons. The site will also comply with additional management needs, including control of weed infestations.

If the reclamation area is not successfully reclaimed or otherwise requires further management activities to establish vegetation, the actions prescribed will be implemented as planned and further monitoring will occur as detailed beginning with the first action listed above.

### PROJECT PROPONENT RECLAMATION MONITORING REPORTS

The project proponent will provide BLM with an annual report before December 1 for all sites disturbed. The report will include—

- Copies of the completed individual site review forms or a BLM-approved electronic report
- A summary of monitoring data and results, including—
  - Individual site reclamation monitoring reporting data (Table A36-1)
  - Identification of sites successfully reclaimed by reclamation years (starting with the first growing season)
  - Identification of sites needing additional work or more reclamation activities by reclamation year
  - Sites proposed for the end of monitoring (i.e., sites that were successfully reclaimed)
- BLM useable shape file(s) or geographic information system (GIS) layer(s) that details location, name, type, and extent of—
  - New disturbances
  - Unreclaimed disturbance
  - New reclamation
  - Failed or unsuccessful reclamation
  - Locations of noxious/invasive weed infestation
  - Further vegetation treatments planned (e.g., mulching, matting, and weed control).

On these shape files or GIS layers, *location* shall be given as the legal location and geo-referenced location of the site; *name*, as appears on the BLM Application for Permit to Drill (APD), lease, or other BLM file name for the site; and *extent*, as the amount of area and location of the item.

## APPENDIX E—RECLAMATION GUIDANCE

### CRITERIA FOR RECLAMATION SUCCESS

Criteria based on pre-disturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition<sup>2</sup> or—

- Eighty percent of pre-disturbance ground cover
- Ninety percent dominant species
- No noxious weeds
- Erosion features equal to or less than surrounding area.

Monitoring results must be from a standardized cover/species protocol finalized by BLM.

**Table A36-1. Reclamation Monitoring Reporting Data**

General	WYW# (Oil and Gas Lease or ROW)
	Project Name
	Project Type (Well, Access Road, Pipeline, Facility, etc.)
	Qtr/Qtr Sec, T, R, County, State
Disturbance	Disturbance Dates
	Start-End
Reclamation	Reclamation Type (Interim/Final)
	Earthwork Contractor Name
	Earthwork & Topsoil Completion Date
	Soil Preparation Ripping Depth
	Area (Acres or Square Feet)
Seeding	Seeding Contractor Name
	Seeding Date
	Seedbed Preparation Methods (Disc, Harrow, Depths)
	Seeding Method (Drill, Broadcast, Depths)
	Copy of Seed Tag (Species percent, Purity percent, Germination percent)
	Actual Seeding Rate (Lbs/Acre)
	Area Seeded (Acres or Square Feet)
Other	Soil Amendments Used (Describe)
	Mulching/Erosion Netting/Tackifier
	Fenced Location
	Snow Fencing
Weeds	Type(s) of Weed Treated
	Weed Contractor Name
	Contractor License #
	Weed Treatment Date
	Weed Treatment Type (Chemical, Mechanical)
	Chemicals Used and Rates Applied
	Area Treated (Acres or Square Feet) (GIS Extent and Location)

<sup>2</sup> The vegetation will consist of species included in the seed mix and/or occurring in the surrounding natural vegetation or as deemed desirable by BLM in review and approval of the reclamation plan. No single species will account for more than 30 percent total vegetative composition unless it is evident at higher levels in the adjacent landscape. Vegetation canopy cover production and species diversity shall approximate the surrounding undisturbed area

## APPENDIX E—RECLAMATION GUIDANCE

**Table A36-1. Reclamation Monitoring Reporting Data, *continued***

Inspection	Inspector's Name, Company, ID
	Inspection Date
	Time After Seeding
	Seedlings/Square Feet Growing
	percent and Extent of Bare Soil
	percent Ground Cover (Describe)
	percent Desirable Species (Describe)
	percent Noxious/Invasive Weeds (Describe)
	Erosion Features Present? (Describe)
	Evidence of Livestock Grazing (Describe)
	Reclamation Successful (Yes/No)
Reporting	Completed Spreadsheet or Database
	GIS Layer with Attribute Table with Site Data as Detailed
	Detail Disturbance Extent and Location
Monitoring	Permanent Reference Point
	Reference Photos
	Close-up Photos
Future Management Prescription	Reseeding
	Weed Control Needed
	Erosion Control Needed
	Grazing/Predation Issues
	Other Cultural or Mechanical Issues

## APPENDIX E—RECLAMATION GUIDANCE



### United States Department of the Interior

BUREAU OF LAND MANAGEMENT

High Desert District  
280 Highway 191 North  
Rock Springs, Wyoming 82901




2800, 3100,  
3200, 3400,  
3500, 3600,  
3700, 3800 (WYD00)

May 30, 2012

Instruction Memorandum No. WYD 2012-005

Expires: 09/30/2016

To: Field Managers, High Desert District  
From: District Manager, High Desert   
Subject: High Desert District Policy for Reclamation of Disturbed Lands

**Program Area:** All Surface Disturbing Activities.

**Purpose:** To affirm and adopt the Wyoming Reclamation Policy as codified in Instruction Memorandum WY-2012-032, dated March 27, 2012.

**Policy/Action:** In order to ensure a consistent and science-based approach to reclamation, the High Desert District (HDD) is adopting and implementing Instruction Memorandum (IM) WY-2012-032 with its ten reclamation requirements as the minimum standards that must be addressed when developing reclamation proposals for all surface disturbing activities occurring within the HDD. Addressing these ten requirements will help achieve both short and long-term reclamation success for site stabilization and eventual ecosystem reconstruction, as well as promoting reclamation planning and implementation consistency within and across the Field Office boundaries.

IM WY-2012-032 is supported with more detailed guidance such as a statewide monitoring and reporting strategy, and sample templates, and other technical guidance posted on the Wyoming Reclamation web site (<http://www.blm.gov/wy/st/eniprograms/reclamation.html>).

**Timeframe:** This IM is effective immediately.

**Budget Impact:** None

**Background:** Successful reclamation efforts are critical in maintaining an effective multiple use land management program. Nearly all authorizations for surface disturbing actions are based upon the assumption that an area can and ultimately will be successfully reclaimed. Those seeking approval to conduct surface disturbing activities on Public Lands must include

## APPENDIX E—RECLAMATION GUIDANCE

reclamation planning as part of their permit process and the BLM must make this requirement clear early in the permitting process. This IM applies to all BLM authorized surface disturbing actions occurring within the High Desert District including those initiated by the BLM.

While development of a reclamation plan is a crucial component to achieving a successful reclamation project, it can also become an overwhelming and overly-burdensome process for operators, lessees, permit holders, and grant holders, as well as for BLM. It is imperative for us to remember that the overriding objective is to achieve successful restoration/reclamation of the disturbed area. It is far more desirable to have our external customers (lessees, operators, and grant holders, etc.), as well as BLM concentrate the bulk of their and our reclamation dollars on the physical on-the-ground reclamation components of the project, rather than on the development of the plan. To that end it is imperative that we require the reclamation plans to include no more than the minimum level of predisturbance site data and project component description than is essential to assure the plan will meet the reclamation objective for the site. In reiteration, do not require operators, lessees, and/or grant holders to gather and provide more information than is necessary to verify that their reclamation plan will accomplish BLM's interim and final reclamation objectives for the site. Remember that all BLM initiated surface disturbance activities occurring within the District are also fully bound by this policy; therefore our internal reclamation plans and pre-disturbance data gathering requirements must be every bit as detailed as those we are requiring from our external customers.

A "hand-in-hand" component with reclamation planning is post-reclamation monitoring. Without effective monitoring we cannot document whether the reclamation project is successful or not, whether it meets the planned objective or not, nor will we have a starting point from which to initiate corrective measures. Effective monitoring will involve both the operators and BLM. Refer to Section 10 of the Wyoming Reclamation Policy.

Existing field office reclamation policies must be reviewed and modified as necessary to insure that they comply with requirements of this IM and with the BLM Wyoming Reclamation Policy WY-2012-032).

## APPENDIX E—RECLAMATION GUIDANCE



United States Department of the Interior  
BUREAU OF LAND MANAGEMENT  
Wyoming State Office  
P.O. Box 1828  
Cheyenne, Wyoming 82009-1828



In reply refer to:  
3042 (921Gamper) P

March 27, 2012

EMS TRANSMISSION: 4/2/2012

Instruction Memorandum No. WY-2012-032

Expires: 9/30/2013

To: District Managers and Deputy State Directors

From: Associate State Director

Subject: Wyoming Bureau of Land Management (BLM) Reclamation Policy

**Program Areas:** All Surface Disturbing Activities.

**Purpose:** Implement the Wyoming Reclamation Policy

**Policy/Action:** In order to ensure a consistent and science-based approach to reclamation, this Instruction Memorandum (IM) identifies ten reclamation requirements (see Attachments) that must be addressed when developing reclamation proposals for all surface disturbing activities. Addressing these ten requirements will help achieve both short and long-term reclamation success for site stabilization and eventual ecosystem reconstruction. The Wyoming Reclamation Policy was previously issued under IM No. WY-2009-022 which expired on September 30, 2010. This IM replaces IM No. WY-2009-022.

**Background:** Successful reclamation efforts are critical in maintaining an effective multiple-use land management program. Nearly all authorizations for surface disturbing actions are based upon the assumption that an area can and ultimately will be successfully reclaimed. Those seeking approval to conduct surface disturbing activities on Public Lands must include reclamation planning as part of their permit process and the BLM must make this requirement clear early in the permitting process. This IM applies to all BLM authorized actions including those initiated by the BLM.

**Timeframe:** Effective immediately.

**Budget Impact:** Savings to Project funds in the long-term.

**Manual/Handbook Sections Affected:** This IM will be supported with more detailed guidance including new reclamation bond standards and a statewide monitoring and reporting strategy.

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Specific reclamation information, sample templates for both reclamation and weed management plans, and other technical guidance is posted on the Wyoming Reclamation web site (<http://www.blm.gov/wy/st/en/programs/reclamation.html>).

**Coordination:** The coordination and review of the Wyoming Reclamation Policy has been completed with the WY BLM Reclamation Team: Brenda Neuman, Mining Engineer, WSO; Ken Henke, Natural Resource Specialist, WSO; Adrienne Pilmanis, Botanist, WSO; Travis Bargsten, Physical Scientist, WSO; and Merry Gamper, Physical Scientist, WSO Lead. Other non-Wyoming BLM specialists, WO-310, the Wyoming Governor's Office (for review by all appropriate State Agencies), the University of Wyoming, some local Governments, and numerous interested reclamation professionals in private industry statewide.

**Contact:** Merry Gamper at 307-775-6272, and by e-mail at [MGamper@BLM.gov](mailto:MGamper@BLM.gov).

Signed By:	Authenticated By:
Ruth Welch	Sherry Dixon
Associate State Director	Secretary

### 2 Attachments

- 1 - Wyoming BLM Reclamation Policy (6 pp)
- 2 - Wyoming BLM Oil and Gas Reclamation Plan Template (4 pp)

### Distribution

Director (200), Rm. 5644, MIB 1	1 (w/o atch)
Director (300), Rm. 5625, MIB 1	1 (w/o atch)
Field Managers	1 (w/atch)
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## APPENDIX E—RECLAMATION GUIDANCE

### Wyoming Reclamation Policy

The Wyoming Reclamation Policy is guidance for the modification, preparation and/or review of all reclamation plans. It applies to all Federal actions authorized, conducted, or funded by the BLM that disturb vegetation and/or the mineral/soil resources. This policy is intended to support all BLM program objectives.

A reclamation plan shall be developed for all surface disturbing activities and will become part of the proposed action in the NEPA document. The level of detail for the reclamation plan shall reflect: the complexity of the project, the environmental concerns, the reclamation potential for the site, and the re-vegetation strategy. These plans shall also incorporate any program or regulatory specific requirements for reclamation. The reclamation plan shall address short term stabilization to facilitate long term reclamation. The reclamation plan is considered complete when all the reclamation requirements described below have been addressed, the techniques to meet the reclamation requirements are described in detail, and the BLM concurs with the reclamation plan.

Many landscapes can be reclaimed using established conventional reclamation methods. However, some areas have unique characteristics that make achieving all the reclamation requirements described in this policy unrealistic. Innovative techniques beyond conventional practices must be considered and applied to reclaim these more challenging areas. Areas posing the most extreme reclamation challenges will be identified as having Limited Reclamation Potential (LRP). These areas are often characterized by highly sensitive and/or erosive soils, highly sensitive vegetation types, soils with severe physical or chemical limitations, extremely steep slopes, etc. These LRP areas may require site-specific reclamation measures not specifically addressed in the Wyoming Reclamation Policy. Each Field Office shall develop a unique set of reclamation success requirements for those areas within the framework of the attached Policy. The additional difficulty of reclaiming these LRP areas should be considered in the Resource Management Plan and evaluated when planning surface-disturbing activities. During the NEPA process, alternatives to approving development activities in LRP areas should be carefully analyzed. Alternatives considered should include: avoidance and/or unconventional site specific reclamation requirements. Resource development activities approved in these areas may require additional bonding.

#### A. RECLAMATION GOALS

1. Short term goal: immediately stabilize disturbed areas and provide conditions necessary to achieve the long term goal.
2. Long term goal: facilitate eventual native plant community and ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan.

#### B. RECLAMATION REQUIREMENTS

*The following Reclamation Requirements apply to all surface disturbing activities, including BLM initiated activities, and must be addressed in each reclamation plan. These requirements also must be met prior to release of the bond and/or the reclamation liability. Where these Reclamation Requirements differ from other applicable Federal laws, rules, and regulations, those requirements supersede this policy. State and/or local statutes or regulations may also apply.*

##### 1. **Manage all waste materials:**

- a. Segregate, treat, and/or bio-remediate contaminated soil material.
- b. Bury only authorized waste materials on site. Buried material must be covered with a minimum of three feet of suitable material or meet other program standards.

## APPENDIX E—RECLAMATION GUIDANCE

- c. Ensure all waste materials moved off-site are transported to an authorized disposal facility.
2. **Ensure subsurface integrity, and eliminate sources of ground and surface water contamination.**
  - a. Properly plug all drill holes and other subsurface openings (mine shafts, adits etc.).
  - b. Stabilize, properly back fill, cap, and/or restrict from entry all open shafts, underground workings, and other openings.
  - c. Control sources of contamination and implement best management practices to protect surface and ground water quality.
3. **Re-establish slope stability, surface stability, and desired topographic diversity.**
  - a. Reconstruct the landscape to the approximate original contour or consistent with the land use plan.
  - b. Maximize geomorphic stability and topographic diversity of the reclaimed topography.
  - c. Eliminate highwalls, cut slopes, and/or topographic depressions on site, unless otherwise approved.
  - d. Minimize sheet and rill erosion on/or adjacent to the reclaimed area. There shall be no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on/or adjacent to the reclaimed area.
4. **Reconstruct and stabilize water courses and drainage features.**
  - a. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins.
  - b. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems.
5. **Maintain the biological, chemical, and physical integrity of the topsoil and subsoil** (where appropriate).
  - a. Identify, delineate, and segregate all salvaged topsoil and subsoil based on a site specific soil evaluation, including depth, chemical, and physical characteristics.
  - b. Protect all stored soil material from erosion, degradation, and contamination.
  - c. Incorporate stored soil material into the disturbed landscape.
  - d. Soil storage piles to be stored beyond one growing season, should be seeded with appropriate vegetation (native or sterile non-native species).
  - e. Identify stockpiles with appropriate signage.
6. **Prepare site for revegetation.**
  - a. Redistribute soil materials in a manner similar to the original vertical profile.
  - b. Reduce compaction to an appropriate depth (generally below the root zone) prior to redistribution of topsoil, to accommodate desired plant species.
  - c. Provide suitable surface and subsurface physical, chemical, and biological properties to support the long term establishment and viability of the desired plant community.

## APPENDIX E—RECLAMATION GUIDANCE

- d. Protect seed and seedling establishment (e.g. erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.)
7. **Establish desired self-perpetuating native plant community.**
- a. Establish species composition, diversity, structure, and total ground cover appropriate for the desired plant community.
  - b. Enhance critical resource values (e.g. wildlife, range, recreation, biodiversity, etc.), where appropriate, by augmenting or accelerating restoration of plant community composition, diversity, and/or structure.
  - c. Select genetically appropriate and locally adapted native plant materials (e.g. locally sourced or cultivars recommended for seed zone) based on the site characteristics and ecological setting.
  - d. Use locally sourced and/or collected seeds to the extent possible (local collection and logistics should be included in the Reclamation Plan).
  - e. Select non-native plants only as an approved short term and non-persistent (i.e. sterile) alternative to native plant materials. Ensure the non-natives will not hybridize, displace, or offer long-term competition to the endemic plants, and are designed to aid in the re-establishment of native plant communities.
8. **Reestablish a complementary visual composition**
- a. Ensure the reclaimed landscape features blend into the adjacent area and conform to the land use plan decisions.
  - b. Ensure the reclaimed landscape does not result in a long term change to the scenic quality of the area.
9. **Manage Invasive Plants**
- a. Assess for invasive plants before initiating surface disturbing activities.
  - b. Develop an invasive plant management plan.
  - c. Control invasive plants utilizing an integrated pest management approach.
  - d. Monitor invasive plant treatments.
10. **Develop and implement a reclamation monitoring and reporting strategy.**
- a. Conduct compliance and effectiveness monitoring in accordance with a BLM (or other surface management agency) approved monitoring protocol.
  - b. Evaluate monitoring data for compliance with the reclamation plan.
  - c. Document and report monitoring data and recommend revised reclamation strategies.
  - d. Implement revised reclamation strategies as needed.
  - e. Repeat the process of monitoring, evaluating, documenting/reporting, and implementing, until reclamation goals are achieved.

## APPENDIX E—RECLAMATION GUIDANCE

### GLOSSARY

**Contamination** - The presence of man-made chemicals or other alterations in the natural soil or water environment (pesticides, hazardous substances, petroleum, salts).

*Adapted from various sources*

**Desired Outcome:** Specific goal/objectives and allowed uses outlined in land use plans. Desired outcomes should be identified for and pertain to resources (such as natural, biological, and cultural), resource uses, (such as energy and livestock grazing), and other factors (such as social and economic conditions).

*BLM Handbook H-1601-1*

**Ecosystem** - Includes all the organisms of an area, their environment, and the linkages or interactions among all of them; all parts of an ecosystem are interrelated. The fundamental unit in ecology, containing both organisms and abiotic environments, each influencing the properties of the other and both necessary for the maintenance of life.

*Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM 2007)*

**Federal Action** - Approval of specific projects, such as construction or management activities located in a defined geographic area. Projects include actions approved by permit or other regulatory decision as well as federal and federally assisted activities.

*National Environmental Policy Act (NEPA) [42 U.S.C. 4321 et seq.]*

**Invasive Plant** - A species that is not native (or is alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Plants listed on the State of Wyoming, Designated Noxious Weed List, would be included under this definition.

*Executive Order 13112, Invasive Species (1999)*

**Limited Reclamation Potential (LRP)** - Areas possessing unique landscape characteristics (e.g., sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock-outcrops, etc.) often make reclamation success impractical and/or unrealistic due to physical, biological, and/or chemical challenges. When disturbed, these areas may require unconventional reclamation strategies to address the ten requirements established by this Policy.

*Adapted from various sources*

**Locally-sourced native plant materials** - seeds, seedlings, transplants, and/or inocula obtained and/or increased from collection at the project location or from nearby similar sites.

*Adapted from various sources including the Integrated Vegetation Management Handbook 1740-2, Ch. 8, and Johnson et al 2010 "What Are The Best Seed Sources For Ecosystem Restoration on BLM and USFS Lands?", Native Plants, 11:2:117-131*

**Reclamation Plan** – The Reclamation Plan is a written document that addresses the reconstruction of disturbed ecosystems by returning the land to a stable and productive condition compatible with the land use plan. The Plan must address all ten requirements included in this Policy.

*Adapted from various sources*

## APPENDIX E—RECLAMATION GUIDANCE

**Scenic Quality** – The overall impression of a landscape retained after driving or walking through, or flying over an area. The Scenic Quality of an area is rated as Class A (outstanding visual characteristics), Class B (combination of outstanding and common visual characteristics), and Class C (common visual characteristics). See *BLM Handbook H-8410 Visual Resource Inventory* and *BLM Handbook H-8431 Visual Resource Contrast Rating*.

**Soil** – A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthly parent material, as conditioned by relief over periods of time.

*Glossary of Soil Science Terms*

**Subsoil** – Technically, the subsoil includes the B horizon. This is roughly, the part of the solum below the organic topsoil and above the rocky parent material of the C horizon. When suitable, the subsoil may be salvaged to supplement the topsoil for plant establishment.

*Adapted from various sources*

**Soil Material** – Includes the topsoil and/or the topsoil and a portion of the subsoil salvaged and separated to be used to provide a growth medium for plant establishment.

*Adapted from various sources*

**Surface Disturbing Activities** – An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other Public Land values. Examples of surface disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and the conduct of several types of vegetation treatments (e.g., prescribed fire, etc.). Surface disturbing activities may be either authorized or prohibited.

*Wyoming Information Bulletin 2007-029, Guidance for Use of Standardized Surface Use Definitions*

**Surface Management Agency** – Any Federal or State agency having jurisdiction over the surface estate. *Adapted from Onshore Oil and Gas Order No. 1*

**Topsoil** – The biologically active, upper part of the soil profile, being the most favorable material for plant growth.

*Adapted from U.S.D.A., Natural Resources Conservation Service*

**Waste materials** – Any discarded or abandoned material that can interfere with successful reclamation, safety, and long term stability of a site (contaminated soil or water, drilling mud, solid waste).

*Adapted from various sources*

## APPENDIX E—RECLAMATION GUIDANCE

### Proposed Interim Rollover Objective for the Continental Divide-Creston Natural Gas Project Environmental Impact Statement and Record of Decision

February 25, 2011

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## **PROPOSED INTERIM ROLLOVER OBJECTIVE FOR THE CONTINENTAL DIVIDE-CRESTON NATURAL GAS PROJECT ENVIRONMENTAL IMPACT STATEMENT AND RECORD OF DECISION**

There were numerous industry/state agency conversations concerning some type of phased or consolidated development for the Continental Divide-Creston (CD-C) Environmental Impact Statement (EIS). Unfortunately the complexity of the lease pattern and the number of leases made this effort extremely challenging. Conversations led to trying to create language for authorizations, waivers, modifications and exceptions to the Bureau of Land Management (BLM) Rawlins Resource Management Plan (RMP) to provide rollover criteria that would contain more flexibility for industry, while maintaining healthy, desirable vegetation within the field.

An ad hoc group came together to see if such an opportunity for additional rollover criteria might exist. The following outlines the framework for the discussion:

1. Provide a scientifically sound framework to minimize initial disturbance and return disturbed areas as quickly and effectively as possible to an ecologically stable or to pre-disturbance condition(s).
2. Identify important interim reclamation practices that are required to ensure initial and continuing interim rollover objectives (IRO).

The group is recommending that the rollover criteria as outlined below be considered as an alternative to the current RMP rollover criteria, provided that all the pre and post disturbance activities as outlined in Sections A through D are implemented.

### **Proposed IRO reclamation rollover criteria**

The current Rawlins RMP Criteria for Reclamation Success are based in part on pre-disturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition or eighty percent of pre-disturbance ground cover and ninety percent dominant species.

Notwithstanding the provisions of the RMP, it is our recommendation to provide an alternative to the above language and have revegetation cover be 70 percent of reference area cover to meet interim reclamation criteria. All of this 70 percent must be desirable perennial species as represented by the seed mix or background species. Items A, B, C, and D would also need to be completed as part of the interim reclamation criteria.

The group understands that the BLM will require a comprehensive reclamation and weed management plan within the CD-C project boundary as well as site-specific reclamation plans. It is understood that many of the items we are recommending may appear duplicative to the existing Wyoming BLM Reclamation Instructional Memorandum or other Field Office reclamation policy. As part of the more flexible rollover criteria outlined below, we recommend that many of these duplicative practices should be required as part of the rollover criteria and not be optional.

### **A. PRE-PLANNING AND INVENTORY**

Pre-disturbance inventories are used for two main purposes. The first purpose is to use site-specific information (soil inventory and species identification) to develop a site-specific reclamation plan. The second purpose is to identify any issues, such as saline soils, steep topography, or invasive species that will impact successful interim and/or final reclamation. Below are the elements that should be required for a more flexible rollover criteria.

#### **1. Identify significant landscape features and climate issues**

- a. Climate and physical characteristics of the site are important factors to consider in development of a reclamation plan, particularly in identifying possible problems. For

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example, a site on a south-facing slope may indicate that more drought tolerant plants should be selected than if the site is on a north-facing slope. Topography (slope and aspect), climate (including postulated microclimate), and parent materials (geological substrates) are additional considerations in site selection and reclamation plan development.

- b. Steep topography: Steep slopes greater than 25 percent would often result in site instability and should be avoided.
- c. Poor or erodible parent materials, or a rocky surface, or marine shales, clay/siltstone, or selenium-bearing geological substrates at the surface may result in difficult reclamation conditions. Identification of these areas might indicate the need for additional site planning.

### 2. Conduct a suitable soil inventory

- a. Soil characteristics strongly influence reclamation efforts. Fundamental characterization of soils ahead of disturbance can identify potential problems, so they can be addressed during disturbance, soil stockpiling and reclamation.
- b. The phrase “suitable soil” is used herein mainly because of confusion over the definition of topsoil. Soil depth, pH, electrical conductivity, texture, surface features (e.g. barren, rocky, crusty, plant litter), and organic matter content are characteristics that may be used to determine if a soil is suitable. Other information may be needed. See “Successful restoration of severely disturbed lands: Overview of critical components,” B-1202, (and available for free at <http://ces.uwyo.edu/PUBS/B1202.pdf>).
- c. Soil characteristics that may signal reclamation problems include: pH, electrical conductivity, soil texture, surface/subsurface features, sodium adsorption ratio, and soil compaction. These are detailed below and will be addressed by the Operator in the site-specific reclamation plan in the APD (application to drill) approved by the BLM:
  - i. Soils with pH 8.4 and higher.
  - ii. Depth: No suitable soil available or very shallow, less than 75 mm (3 inches).
  - iii. Soil solutions with an electrical conductivity greater than eight (8) dS/m.
  - iv. Sodium Adsorption Ratio (SAR) of 13 or higher when pH is greater than 8.4 and EC is greater than 4.0ds/m.
  - v. Soils having textures of clay, sand or loamy sand.
  - vi. Surface and subsurface soil in and through the root zone dominated by coarse material greater than 2 mm in diameter and greater than 40 percent in the soil profile.

### 3. Conduct a vegetation inventory

- a. Gathering vegetation data before a site has been cleared for drilling documents pre-disturbance site conditions and in turn guides reclamation decisions. Seed mixes should be based on desired vegetation that has historically grown on-site and return of cover should be gauged by comparison with actual pre-disturbance site conditions and/or reference areas.
- b. The following vegetation characteristics can signal a high probability of reclamation problems:
  - i. The presence of Halophytes: e.g. Saltbush
  - ii. The presence of Alkali Halophytes: e.g. Greasewood, Halogeton



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- iii. The presence of noxious or invasive species: e.g. Cheatgrass, Russian thistle, Russian knapweed, Alyssum, Canadian thistle.
- c. The methodologies to be used to determine the information for the vegetation inventory are as follows:

BLM guidelines for vegetation sampling: Sampling Vegetation Attributes, Interagency Technical Reference (1996) Revised in 1997 and 1999. BLM/RS/ST-96/002+1730. 171 pages. URL for Sampling Vegetation Attributes:  
<http://www.blm.gov/nstc/library/pdf/samplveg.pdf>. All BLM technical references:  
<http://www.blm.gov/nstc/library/techref.htm>.

### 4. Select a reference site

- a. A reference site is a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of an area to be disturbed. Reclaimed sites are compared to reference sites to determine successful interim and final reclamation.
- b. In Wyoming, a site may be composed of multiple ecological communities (e.g. dunes, alkali flats, and sagebrush). Ecological variation at a given site can make it difficult to evaluate which adjacent area should serve as a reference. A reference site should be chosen based upon the pre-disturbance assessment and the identified dominant community on the site. This measure ensures that initial efforts to establish vegetation are consistent with species that naturally occur at that location. A reference site located adjacent to the site to be disturbed, with similar soils, vegetation, and aspect of the site to be disturbed should be chosen.

## B. DEVELOP A SITE-SPECIFIC INVASIVE/NOXIOUS (INVASIVE) PLANT MANAGEMENT PLAN FOR CONSTRUCTION AND RECLAMATION ACTIVITIES:

Disturbed sites can provide ideal opportunities for invasive plant species to propagate. An integrated site-specific invasive plant management plan should be developed. The plan should include:

- 1. Assessment activities for invasive plant species before initiating surface disturbing activities (pre-disturbance), during disturbance (annual monitoring), during interim and final reclamation, and after reclamation is completed.
- 2. Describe treatments to control invasive plants.
- 3. Monitor invasive plant species at least annually to evaluate success of invasive plant control treatments and determine if continued invasive plant control is necessary.

## C. DEVELOP A SITE-SPECIFIC RECLAMATION PLAN:

Reclamation planning provides a detailed strategy for returning a disturbed site back to a functioning pre-disturbance condition. The site-specific reclamation plan will be made part of the APD by the Operator and BLM and includes the following:

- 1. **Identify and address any vegetation, climate, landscape or soil issues found in the pre-disturbance inventory.**
- 2. **Site preparation, storm water, surface stability, and soil management for interim reclamation.**

Site preparation activities ready a site for revegetation activities and in general include replacement of stockpiled suitable and unsuitable soils, reestablishing a stable subsurface environment, recontouring (reconstruction of landscape), incorporation of soil amendments

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and primary tillage/ripping to relieve soil compaction prior to spreading suitable soil and secondary tillage.

- a. Proper soil management prevents loss from erosion and preserves its ability to support a productive plant community, the soil biota and their habitat as well as its physical and chemical properties.
- b. The Storm Water Pollution Prevention Plan (SWPPP) as required by Department of Environmental Quality (DEQ) should be followed.
- c. Surface Stability: The following describes considerations for how the Operator could achieve surface stability:
  - i. Redistribute soil materials in a manner to optimize revegetation potential.
  - ii. Relieve compaction of the redistributed soil (suitable and unsuitable) to an appropriate depth just prior to seeding to accommodate desired plant species germination and sustained growth.
  - iii. Preparation of the seedbed includes but not limited to:
    - a. Seedbed preparation methods should establish surface conditions to enhance development of diverse, stable, and self-generating vegetation. The methods selected should optimize surface stability and surface roughness using techniques such as furrowing on the contour or surface pitting.
    - b. Re-establish slope stability and surface stability.
    - c. Reconstruct the landscape to the approximate original contour or a contour consistent with the land use plan.
    - d. Maximize geomorphic stability and topographic diversity of the reclaimed topography.
    - e. Eliminate high walls, cut slopes, and/or topographic depressions on site, unless otherwise approved.
    - f. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins.
    - g. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems.
    - h. Minimize wind, sheet and rill erosion on/or adjacent to the reclaimed area.
    - i. There should be no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on/or adjacent to the reclaimed area. Site selection is the favorable method to avoid these issues.
    - j. Protect seed and seedling establishment (e.g. erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.)

### 3. Describe soil amendments

- a. Soil amendment(s) may be used in reclamation if the soil is lacking the necessary chemical, biological, physical and /or organic materials to support sustaining growth of suitable plant materials.

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- b. The Operator should state what applying soil amendments is intended to accomplish. Soil amendment plans should be provided, including what amendments will be applied, method of application, and timing relative to other reclamation activities (i.e. stockpiling, seeding, ripping).
- c. Soil amendments should be selected based on the undisturbed and/or existing soil characteristics (see A. 2. c. iii) and scientific recommendations so as to provide the most cost efficient and best assurances for successful reclamation.
- d. Soil amendments include but are not limited to the following: Certified weed free grass, hay, wood chips or other certified weed free cellulosic materials, gypsum, elemental sulfur, and fertilizers.

### 4. Describe seeding methods

- a. Different plant species may require different conditions (e.g. seeding depth, seed scarification, mixing, and timing) for optimal germination success. Seeding methods should match germination characteristics of species in the seed mix and consider timing of planting to maximize germination and establishment of all reclamation species.
- b. The Operator will describe when seeding will occur and specify the methods they will use for seeding, including differential handling for different species (e.g. broadcast, drilling, imprinting), and seeding depth in the site-specific reclamation plan of the APD. Reseeding may need to occur if invasive and/or noxious weeds prevent establishment of the species in the seed mix. See Appendix A for references.

### 5. Seed mixes

- a. Providing multifunctional and sustainable seed mixes for interim and final reclamation is driven by a desire to increase potential for successful and timely revegetation and site stability. Plant diversity and habitat functionality are directly impacted by the seed choices applied to an area slated to be reclaimed or restored. To maintain as much stability and ecological function, this section makes recommendations to specifically aid an operator's selection process. Please see Appendix A for references.
  - i. Select appropriate native plant materials based on the pre-disturbance plant community composition, site characteristics, and/or ecological site description. Seeds may be obtained from commercial sources of certified weed free seed mixes. Alternatively, local collections may be used provided they are collected in an area without invasive species. Reclamation should succeed using native species if soils are properly managed, precipitation is near average for the region, seed mixes are carefully selected and seeded areas protected from grazing.
  - ii. Perennial naturalized species may be used when attempts to reclaim using native plants have not succeeded for a minimum of two full growing seasons.
  - iii. Based upon site-specific conditions, a decision may be made to use naturalized species sooner than identified above and will be used in only unique conditions defined in the site-specific reclamation plan in the APD.

### 6. Describe if and how irrigation techniques will be used in the reclamation plan.

- a. Revegetation success is highly dependent on timing and amounts of precipitation. However, variable weather in Wyoming can limit or delay successful germination and establishment of plants. Irrigation can supplement natural precipitation to insure success of newly seeded sites during the initial growth period of the plant. Irrigation practices should

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be used carefully and conservatively. Irrigation can be cost prohibitive and should not be a requirement for reclamation but used as a tool to enhance vegetation establishment.

- b. Both soil and water samples should be tested before application and water source should meet appropriate limits for SAR and EC. Special consideration of soil chemistry and amendments will be a determining factor for the use of the source water.
- c. Water must be utilized from permitted sources (State Engineer's Office) and from sources permitted for irrigation. Produced water, (e.g. coal bed natural gas wells) must adhere to discharge permit requirements.

### **7. Describe best management practices**

- a. Best Management Practices (BMPs) are techniques that can be applied to surface disturbance and reclamation actions to aid in reclamation success. Identify the appropriate BMPs during planning and they can guide the surface disturbance and reclamation process. Additionally, documenting BMPs provides opportunities to evaluate success, so BMPs can be modified for future use in similar conditions. Please see Appendix A for recommended BLM and other Best Management Practices.

### **8. Description of monitoring and reporting protocols for interim reclamation objective.**

The purpose of the Interim Reclamation Objective (IRO) is to reconstruct and revegetate the portion of the disturbed land unused for long term production and establish the vegetation cover sufficient to maintain a healthy, biologically active topsoil; control erosion; and minimize habitat, visual and forage loss during the life of the well and/or facilities.

The long-term Final Reclamation Objective (FRO) is to return the land to a condition that which existed prior to disturbance with allowances for an improved and/or stable ecological condition, if possible.

- a. Site monitoring is conducted to observe and keep track of environmental conditions on the reclaimed site. Specifically, monitoring is done to document development of the reseeded plant community, identification of problem species, soil stability and assess ecosystem function. Continued characterization after disturbance and during interim reclamation is appropriate for monitoring site maturation and stability, particularly when problematic soil conditions or invasive weeds are identified.
- b. Vegetation monitoring and disturbed site evaluation for any component of the reclamation plan applicable to the APD takes place at intervals agreed to by the BLM and the Operator. Generally the intervals for monitoring and reporting will be set annually unless otherwise agreed to as a condition to the reclamation plan. Achievement of the IRO by the Operator may reduce the time of mandatory monitoring and reporting. These changes to monitoring and reporting will be added to the reclamation plan by the BLM. Once the disturbed site achieves the approved IRO, the site will still be subject to all applicable requirements of the reclamation plan until the FRO is achieved by the Operator and approved by the BLM.
- c. Monitoring should be designed and implemented by the Operator to document continuing successful reclamation rollover using methodologies approved by BLM.
  - i. Once the IRO is achieved and reclamation rollover granted by BLM, the Operator will continue to monitor the condition of the reclamation, document that the revegetation continues to meet IRO.
  - ii. During monitoring, the Operator will identify potential problems and recommend appropriate mitigation measures that can be implemented through BLM's adaptive management process.

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- d. The required elements of monitoring to assess IRO and FRO will be identified and addressed by the Operator in the site-specific reclamation plan. Please see Appendix A for additional information.

### D. INDICATORS FOR SUCCESSFUL ACHIEVEMENT FOR THE IRO RESULTING IN RECLAMATION ROLLOVER

1. **Beginning Monitoring.** Monitoring should begin in the first growing season. Rollover evaluation is possible after a minimum of two full growing seasons.
2. **Irrigation and monitoring.** If irrigation is used initially, then the reclamation may be evaluated for interim reclamation success two (2) full growing seasons (or the third growing season) after irrigation ceases to assure that the vegetation can survive without supplemental water.
3. **Monitoring results must be from a standardized cover/species protocol approved by BLM.**
4. **Invasive Plants.** No invasive weeds will be allowed. Invasive species cover no greater than adjacent invasive species cover will be allowed. All other undesirable perennial or annual plants as defined in the site-specific APD should be controlled or eradicated on the disturbed area.
5. **Undesirable/annual plants.** For purposes of successful IRO achievement, the amount of invasive plant species should comply with the site-specific reclamation plan.
6. **Vegetation trend.** If the vegetation trend towards the IRO achievement is not positive within 3 full growing seasons without irrigation or 2 years after irrigation (third growing season) ceases, the BLM and Operator will determine the needs for the disturbed site.
7. **Erosion.** Erosion indicators should be equal to or less than the adjacent reference area.

### E. RECLAMATION MONITORING REPORTING DATA RECOMMENDED TO BE OBTAINED AND FILED BY THE OPERATOR (ADAPTED FROM APPENDIX 36 OF THE RAWLINS RMP)

#### General

WYW# (Oil and Gas Lease or Right-of-Way (ROW))  
Project Name:  
Project Type (e.g. Well, Access Road, Pipeline, Facility, Wind)  
Qtr/Qtr Sec, T, R, County, State (or Lat/Long)

#### Pre-Disturbance

Location of reference area  
Date of reference area inventory/monitoring  
Date of pre-disturbance inventory of disturbed site  
Name of contractor conducting reference and pre-disturbance inventory/monitoring

#### Disturbance

Disturbance Dates  
Start –End dates of monitoring  
Reclamation Type (Interim/Final)  
Name of contractor

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### Reclamation

Earthwork Contractor Name  
Earthwork Completion Date  
Soil Preparation method and Depth (prior to re-spreading suitable soil)  
Soil Amendments Used (Describe)  
Area (Acres or Square Feet)  
Seeding Contractor Name  
Seeding Date  
Seedbed/Compaction Release Preparation Methods (Describe -Rip, Disc, Harrow, Parabolic) and Depths  
Seeding Method (Drill, Broadcast, Imprint, Depths)  
Copy of Seed Tag (Species percent, Purity percent, Germination percent)  
Actual Seeding Rate (Pure live seed (PLS) Lbs/Acre of each species)  
Area Seeded (Acres or Square Feet)

### Noxious/Invasive Plants

Species Treated  
Contractor Name  
Contractor License #  
Treatment Date  
Treatment Type (Chemical, Mechanical)  
Chemicals Used and Rates Applied  
Area Treated (Acres or Square Feet) (GIS Extent and Location)

### Monitoring

Inspector's Name and affiliation  
Inspection Date  
Time after Seeding (which Growing season)  
Seedlings/Square Feet or Linear Foot Growing  
Percent and Extent of Bare Soil (Describe)  
Percent Ground Cover (Describe)  
Percent Desirable Species (Describe)  
Percent Noxious/Invasive Weeds (Describe)  
Describe erosion indicators  
Evidence of Livestock Grazing (Describe)  
IRO objectives met (Yes/No)  
Reference Photos  
Close-Up Photos  
On-site Photos  
Reseeding yes/no, If yes all the above reporting requirements to be filled out.

### Reporting

Completed Spreadsheet or Database as defined by BLM  
GIS Layer with Attribute Table with Site Data as Detailed  
Detail Disturbance Extent and Location  
Permanent Photo Reference Point –Describe  
Conclusions/Summary

- Weed Control Needed - yes/no and explanation
- Erosion control Needed - yes/no and explanation

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- Grazing/Predation Issues - yes/no and explanation
- Other Cultural or Mechanical Needs - yes/no and explanation

### **Other**

Mulching/Erosion Netting/Tackifier used – yes/no and describe

Fenced Location yes/no

Snow Fencing yes/no

## APPENDIX A

This appendix is designed to provide a very general description of stockpiling suitable soil, irrigation of reclamation sites and monitoring vegetation and soils after reclamation. These are not hard and fast prescriptions but rather they are best management practices that might best be considered as an outline of issues to be considered during reclamation efforts.

### A. Suggestions on Stockpiling Suitable and Unsuitable Soils to Maintain Soil Quality

Stockpiled suitable soil should not be piled too deeply or too shallowly. Areas of the site to be covered by stockpiles of unsuitable soils will be stripped of suitable soil prior to their use. The taller or deeper the piles, the more soil is subjected to increasing pressure resulting in compaction. Soil buried deep in the pile also has little exposure to oxygen resulting in anaerobiosis; deeply buried soil also has no organic matter input. Both of these reduce soil quality.

Shallow or small suitable soil stockpiles have large footprints on the land surface with the disadvantage of covering greater areas of undisturbed soil which will, in turn, require revegetation, resulting in a greater overall amount of disturbed soil. Smaller or shallow stockpiles also have a greater surface area per volume of soil stored. This increases exposure of the stockpiled soil to wind and water erosion. The surface of soil stockpiles should always be vegetated to minimize erosion losses.

1. Salvaged stockpiles of suitable soil should normally be no deeper than 4 meters (13 ft) and should be less where possible.
2. Stockpile slopes should not exceed 3:1 angles (20 percent slopes) to allow for seeding and to minimize erosion.
3. Suitable soil stockpiles should be located in areas well enough protected to prevent their disturbance and contamination by well pad activities. They should not be placed in streambeds or ephemeral drainages where they may be washed away. They should be protected from wind erosion. Suitable soil should be put on areas that were not skinned. Unsuitable soil should be put on areas that were 'skinned'.
4. Consider a perimeter ditch/berm/fencing or other techniques around the stockpile for topsoil conservation and sediment control.
5. All suitable soil stockpiles should be seeded with appropriate vegetation (native locally sourced is preferred) to provide cover and protect them from water and wind erosion. Before seeding, the stockpile may be scarified along contours to minimize wind and water erosion.
6. If soil horizons or layers are to be stratified during soil salvage (stripping) operations, soil maps should be made of the well pad area to identify depths of soil horizons and surface slope. The pad area to be cleared of soils should then be divided into strips the size of the blades or equipment being used for soil removal. The depth of soil removal from each swath should be clearly marked so that equipment operators are removing a uniform layer from each strip. After the suitable soil is removed from the area in this manner, the subsoil can then be removed in the same fashion, strip by strip, each strip at a uniform depth.

### B. Suggestions on Supplemental Irrigation

Supplemental irrigation should be scientifically calculated and applied in the initial four to six week period of growth of the seedling plants and then ended. Such determination could be the application of an amount of irrigation water equivalent to the average or average plus 25 percent of the precipitation expected during a given interval.



### C. Suggestions on Vegetation and Soil Monitoring

Examples of monitoring components are listed below:

1. Reference: <http://agriculture.wy.gov/images/stories/pdf/forms/natres/rangelandmonitoring.pdf>
2. Operators should use the same locations and methods used at baseline for repeat photography. Additional locations may be selected to document progress of reclaimed area to demonstrate interim and final reclamation success, and to monitor any identified problems such as erosion. The site should be photographed once every year normally during the same time period, from the same locations and direction so that photographs are repeated through time. Photographs should be taken during the growing season.
3. Weed assessment: Disturbed and reclaimed areas should be evaluated for noxious and invasive plants at least annually. Weed control should be promptly implemented by the Operator once weed species and infestations are identified. Weed control applied at planned chemical rates at times the weed is emerging can have positive impacts in minimizing weed growth through-out the year as well as promoting the growth of grass species. The timing of the control should be determined by the growth habits of the weed species and when they are most effectively assessed. If weeds persist, reseeding the site could be considered as well as the species of grass, forb or shrub.
4. Erosion control/soil stability: The reclaimed area should be evaluated for any signs of erosion problems annually and when the site is subject to erosional events. Identified erosion features should be monitored using repeat photography. Absence of erosion features is a positive indication that the soil is stabilizing.
5. Cover and composition data should be used to document that the plant community continues to trend toward the requirements to achieve interim and final reclamation targets. The data should be used to evaluate if species composition and cover are increasing. These factors should be considered relative to the number of species in the seed mix, the selected reference area, and offsite responses to seasonal growing conditions.
6. Plant community cover and composition measurements: The Operator should start collecting cover and composition data beginning in the first (1<sup>st</sup>) growing season after disturbance. Data should be collected using repeatable methods approved by the appropriate regulatory authority (BLM) and should be the same methods that were used to describe vegetation for baseline (or reference areas). The same methods should be used each time the vegetation is monitored.
7. Soils should be monitored if reclamation problems suggest that soils might be the problem. Such problems include but are not limited to salt crusts, clay crusts, wind and/or water erosion and rapid changes in pH (up or down). Recommended soil monitoring would include sampling soils and analysis of soil characteristics as described in the main body of Part A, 2 ii. Suitable soil inventory.

## D. Web Links

### Government Documents

2006 Gold Book:

[http://www.blm.gov/wo/st/en/prog/energy/oil\\_and\\_gas/best\\_management\\_practices/gold\\_book.html](http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html)

BLM engineering drawings, roads & fences: <http://www.blm.gov/nstc/eng/draw.html>

BLM Integrated Vegetation Handbook, 1740-2 is at page:

[http://www.blm.gov/wo/st/en/info/regulations/Instruction\\_Memos\\_and\\_Bulletins/blm\\_handbooks.html](http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/blm_handbooks.html)

BLM VRM: [http://www.blm.gov/wo/st/en/prog/Recreation/recreation\\_national/RMS.html](http://www.blm.gov/wo/st/en/prog/Recreation/recreation_national/RMS.html)

BLM New Onshore Order #1, May 7-07:

[http://www.blm.gov/wo/st/en/prog/energy/oil\\_and\\_gas/Onshore\\_Order\\_no1.html](http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/Onshore_Order_no1.html)

BLM NSTC: <http://www.blm.gov/nstc/>

EPA: <http://www.epa.gov/owow/nps/> and <http://www.blm.gov/bmp/>

USDA Monitoring Manual for Grasslands, Shrublands and Savanna Ecosystems (quantitative Protocols):

[http://usda-ars.nmsu.edu/monit\\_assess/monmanual\\_main.php](http://usda-ars.nmsu.edu/monit_assess/monmanual_main.php)

Wyoming BLM requirements: [http://www.blm.gov/wy/st/en/programs/energy/Oil\\_and\\_Gas.html](http://www.blm.gov/wy/st/en/programs/energy/Oil_and_Gas.html)

Wyoming Climate Atlas: [http://www.wrds.uwyo.edu/sco/climate\\_office.html](http://www.wrds.uwyo.edu/sco/climate_office.html)

WY DEQ: <http://deq.state.wy.us/wqd/watershed/nps/npspg.htm>

NRCS fotog: <http://efotg.nrcs.usda.gov/treemenuFS.aspx>

### Journals

American Society of Mining and Reclamation: <http://www.asmr.us/>

Global Restoration Network: [www.globalrestorationnetwork.org](http://www.globalrestorationnetwork.org)

Journal Range Management archives: <http://jrm.library.arizona.edu/jrm/>

National Roadside Vegetation Management Association: <http://www.nrvma.org>

Society for Ecological Restoration (SER): <http://www.ser.org/>

USFS Rocky Mountain Research Station publications: <http://www.treearch.fs.fed.us/pubs/rmrs/>

Wyoming Native Plant Society: [http://uwadmnweb.uwyo.edu/wyndd/wnps/plant\\_id.htm](http://uwadmnweb.uwyo.edu/wyndd/wnps/plant_id.htm)

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### MAPS/GIS

Topo & aerial photos: <http://www.usgs.gov/pubprod/aerial.html>

NRCS National Water and Climate Center: <http://www.wcc.nrcs.usda.gov/wcc.html>

Water Erosion Prediction project: <http://octagon.nserl.purdue.edu/weppV1/>

Wyoming Geographic Information Science Center: <http://www.wygisc.uwyo.edu/>

Mycorrhizae (Biological Soil Crusts)

<http://mycorrhiza.ag.utk.edu/default.html>

<http://invam.caf.wvu.edu/index.html>

<http://www.ars.usda.gov/is/pr/2003/030205.htm>

<http://soilcrust.org>

### OIL/GAS

Completion and workover wastes: <http://www.epa.gov/wastes/nonhaz/industrial/special/oil/wc.pdf>

Dust suppression: [http://www.oznet.ksu.edu/Stevenson/Dust\\_percent20Manual\\_percent20percent20102704.pdf](http://www.oznet.ksu.edu/Stevenson/Dust_percent20Manual_percent20percent20102704.pdf)

Hydraulic Fracturing (Fracking or Frac Job):

[http://test.earthworksaction.org/index.php/issues/detail/hydraulic\\_fracturing\\_101](http://test.earthworksaction.org/index.php/issues/detail/hydraulic_fracturing_101)

[http://www.epa.gov/hfstudy/HF\\_Study\\_Plan\\_110211\\_FINAL\\_508.pdf](http://www.epa.gov/hfstudy/HF_Study_Plan_110211_FINAL_508.pdf)

National LTAP & TTAP Rural Roads: <http://www.ltap.org/>

Oil & Gas Production wastes: <http://www.epa.gov/wastes/nonhaz/industrial/special/oil/>

Power lines: <http://www.aplic.org/>

Produced water: <http://www.iogcc.state.ok.us/Websites/iogcc/producedwater/popup.htm>

The T<sup>2</sup>/LTAP Center University of Wyoming: <http://www.weng.uwyo.edu/wyt2/>

Western Governors CBM BMPs: <http://www.westgov.org/wga/initiatives/coalbed/CoalBedMethane.pdf>

Wyoming Oil and Gas Commission requirements: <http://wogcc.state.wy.us/>

### Restoration Handbooks

Bags Quiet Presence NRCS: [http://www.wy.nrcs.usda.gov/Plant/tech\\_notices.html](http://www.wy.nrcs.usda.gov/Plant/tech_notices.html)

Dryland pastures: <http://msuextension.org/publications/AgandNaturalResources/EB0019.pdf>

Handbook of Western Reclamation Techniques:

<http://www.techtransfer.osmre.gov/NTTMainSite/Library/hbmanual/westrecl/front-matter.pdf>

Restoring Western Ranges and Wild lands: [http://www.fs.fed.us/rm/pubs/rmrs\\_gtr136\\_3.pdf](http://www.fs.fed.us/rm/pubs/rmrs_gtr136_3.pdf)

Solid Minerals reclamation handbook: <http://www.blm.gov/nhp/efoia/wo/fy01/ib2001-081attach.pdf>

### Scientific Literature

An Introduction to using native plants in Restoration:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Geology and Plant life:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Managing Arid and semi-arid watersheds: <http://www.wy.blm.gov/botany/wyspecies.htm>

## APPENDIX E—RECLAMATION GUIDANCE

[http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/laws\\_index.cfm](http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/laws_index.cfm)

Revegetation Abstracts:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Sagebrush: <http://sagemap.wr.usgs.gov/SagebrushAssessment.aspx>

Salt tolerant plants: <http://www.ussl.ars.usda.gov/pls/caliche/Halophyte.query>

USDA Plant database: <http://plants.usda.gov/>

Wyoming Natural Diversity Database: <http://uwadmnweb.uwyo.edu/wyndd/>

Wyoming Plant Materials Technical notes:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Wyoming Reclamation and Restoration Center: <http://uwadmnweb.uwyo.edu/WRRC/>

### **Educational Opportunities and Workshops**

Wyoming Reclamation and Restoration Center: <http://uwadmnweb.uwyo.edu/WRRC/>

### **Seed sources**

Guidebook to Great Basin seeds:

[http://www.blm.gov/id/st/en/info/publications/technical\\_bulletins/TB05-4.html](http://www.blm.gov/id/st/en/info/publications/technical_bulletins/TB05-4.html)

Native Plant Propagation Protocols: <http://nativeplants.for.uidaho.edu/network/>

Native Seed Network: <http://www.nativeseednetwork.org/index>

Oregon state Seed Lab: quality testing of native seed: <http://seedlab.oregonstate.edu/u>

Seed testing protocols: <http://www.aosaseed.com/publications.htm>

Wyoming State Seed Lab: <http://uwacadweb.uwyo.edu/seedlab/default.htm>

### **Soil**

Glossary of Soil Science Terms: <http://soils.usda.gov/technical/>

NCSS Web Soil Survey:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

<http://www.nrcs.usda.gov/>

<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

NRCS Soil Quality Publications: <http://soils.usda.gov/technical/>

Soil series name search: <http://soils.usda.gov/technical/classification/>

### **Weeds**

Halogeton: <http://www.ars.usda.gov/Services/docs.htm?docid=9937>

Weed Science Society of America: <http://www.wssa.net>

TNC Invasive species (weeds): <http://tncinvasives.ucdavis.edu/>

### **Wildlife**

Important Wildlife Habitats: <http://wgfd.wyo.gov/web2011/wildlife-1000426.aspx>

Sage grouse range wide forum links: <http://sagegrouse.ecr.gov/?link=110>

## APPENDIX E—RECLAMATION GUIDANCE

Recommendations for Development of Oil and Gas Resources within Crucial and Important Habitats:

[http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/HABITAT\\_OILGASRECOMMENDATION0000333.pdf](http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/HABITAT_OILGASRECOMMENDATION0000333.pdf)

## **E. List of Participants**

This document has been two years in the making and meetings included training sessions and visits to field sites in the general vicinity of the CD-C. The contributors of this document were members of an *ad hoc* committee that varied in size from meeting to meeting. This ad hoc group was created through the efforts of the Governor Freudenthal's Planning Office. Some of the participants were advisory only (AO) but others were involved in the writing, review and synthesis (WRS) of the final project. One member of the committee acted as the Chair.

Considerable review, both formal and informal, of this document was provided by the committee and an intensive external review was provided by an anonymous consultant.

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## **APPENDIX E—RECLAMATION GUIDANCE**

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**BLM Rollover Criteria  
Continental Divide-Creston Environmental Impact Statement**

**INTRODUCTION**

It is reasonable to anticipate that successful reclamation activities within the Continental Divide-Creston project area will be difficult. This can be observed by reviewing **Map 3.3-5** which shows an estimated 75 percent of the area with “poor” reclamation potential. Reclamation potential of soils in the CD-C project area is limited by saline/sodic soil conditions and either clayey or sandy soil textures (**Table 3.3-1**). In addition to these soil limitations, low annual precipitation of 6 – 10 inches in conjunction with erosion by wind and water will make successful reclamation difficult to attain quickly. Periodic droughts and extreme climatic conditions further complicate successful reclamation.

**RECLAMATION PERFORMANCE MONITORING**

Monitoring should include both qualitative data collection techniques and quantitative data collection. Qualitative evaluation of the interim reclamation can include the evaluation of soil movement (rills, sheet flow, petal-stilling, etc.), vegetative components (presence/absence of species, estimation of population and the population’s condition) as well as visual contrast. The quantitative data collection should include both aerial and basal cover. The data should note the species during the evaluation. It is important to use the same methods for qualitative and quantitative data collection during each site evaluation to show a trend and display that the Interim Rollover Objective (IRO) has been met.

**DISTINCTION BETWEEN INTERIM AND FINAL RECLAMATION**

Two types of reclamation will occur within the CD-C area. Final reclamation occurs when all facilities are removed (e.g. plugged and abandoned, the site is re-contoured back to its original topography, and adequate native vegetation communities similar to those originally disturbed are established including, in part, weed control and stable soils). When completed and accepted the company’s bond is released and the site returns to BLM control. High desert sites, such as those found at CD-C, are slow to return to their original vegetative states, often requiring decades of time even with successful reclamation.

Interim reclamation occurs within the next growing season on any disturbance not needing to be continuously disturbed by ongoing operational activities. The existing pipelines, roadsides, and portions of well pads not needed for operations are examples of short-term disturbance which requires interim reclamation. Areas with interim reclamation may be disturbed again by new construction or operational activities that may occur. Those areas will be reclaimed after any disturbance to maintain interim reclamation. Areas of a well pad might also remain undisturbed until final reclamation is achieved. Circumstances will vary site by site over the course of the project.

**PURPOSE OF A DISTURBANCE CAP**

A disturbance cap is a limit on the extent of surface disturbance that can occur within a given area. A disturbance cap that has potential to limit development activities within an area creates a direct incentive for developers to conduct successful reclamation on disturbed lands. Once the disturbance cap is reached further development is constrained until the disturbance acreage is reduced as a result of attaining the IRO.



## **APPENDIX E—RECLAMATION GUIDANCE**

### **ROLLOVER CONCEPT**

Surface disturbance that has been reclaimed to the IRO standard will be classified as successful interim reclamation and this acreage can then be deducted from the number of acres counted as surface disturbance (or rolled over) for the area, and further disturbance could occur under the disturbance cap. The conditions under which interim reclamation can be considered acceptable for “rollover” are crucial for managing disturbance and the effects thereof on the natural resources BLM manages.

### **OBJECTIVES FOR INTERIM RECLAMATION**

Work conducted in part by the State of Wyoming, local Conservation Districts, the University of Wyoming, participating leaseholders, oil and gas developers, and the BLM led to the development of several objectives for interim reclamation. It was agreed that the purpose of the IRO is to identify when reconstruction and re-vegetation activities on disturbed lands is adequate for rollover credit for the companies. Rollover credit could not be applied to the portion of the disturbed surface used for long-term production and continuous disturbance.

The IRO is to establish vegetation cover sufficient to maintain a healthy, biologically active topsoil; control erosion; and minimize habitat, visual, and forage loss during the life of the disturbed area. In addition, it was determined that the elimination of noxious weeds and the control of invasive non-native weeds must have occurred for successful attainment of IRO.

### **RECLAMATION ROLLOVER CRITERIA**

The reclamation success standards listed below are the measures that would be used to evaluate whether the interim reclamation is successful:

- The area is revegetated with a stable, approved plant community.
- Vegetative cover is sufficient to maintain a healthy, biologically active topsoil.
- Erosion is controlled.
- Habitat, visual, and forage loss is minimized.
- No noxious weeds are present.

### **ACCOUNTING FOR DISTURBANCE TRACKING**

Once a proposal for surface disturbance is approved and constructed the company will record the as-built disturbance using a GPS system compatible with the BLM’s system. The extent of all disturbance from the approved proposal will be determined. The company will maintain a record of the extent of disturbance, generally by aliquot section, Township and Range, or by lease as applicable.

When further disturbance within an area is proposed the company will submit its existing disturbance records for the area in question to the BLM along with the rest of its plan of development. The BLM will review the existing extent of disturbance.

If the disturbance extent meets or exceeds the applicable disturbance extent cap then the BLM will request from the Company why further disturbance should be approved. Based on the response from the company the BLM will consider the proposal in the site-specific NEPA document for the proposal tiered to the CD-C Record of Decision (ROD).

If the new disturbance extent proposed does not meet or exceed the disturbance cap for the area in question the BLM will evaluate the proposal with a site-specific NEPA document and determine what, if any, disturbance will be approved. Once construction activities are completed the company will supply

## **APPENDIX E—RECLAMATION GUIDANCE**

the BLM with the new as-built surface disturbance extent as provided above. The new disturbance information will be added to the existing data to determine the current disturbance figure.

Reclamation of the disturbed surface by the companies will be monitored by the companies at least annually as provided in the reclamation monitoring provisions of the Reclamation Plan. When the company feels disturbed sites have attained the IRO described above, the company may propose to the BLM to withdraw the acreage meeting the IRO from the surface disturbance acreage estimate. The BLM will reduce the disturbance figure when it is determined by the BLM that the IRO has been met, from data supplied by the company. The BLM may consult with cooperating agencies in its assessment of the data but the BLM is the final decision-maker on whether the IRO has been attained.

In the event areas meeting the IRO that have been removed from the disturbance are in turn re-disturbed, the acreage re-disturbed will be added back into the surface disturbance acreage estimate.

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## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-1. BLM range gage yearly precipitation averages (gages within and adjacent to the CD-C project area)**

<b>Name</b>	<b>Location</b>	<b>Record</b>	<b>Minimum (inches)</b>	<b>Maximum (inches)</b>	<b>Average (inches)</b>
Adams	SWSW Section 11 T17N: R92W	1987 - 2010	4.58	12.91	8.52
Creston	SESE Section 22 T20N: R92W	1986 - 1996, 1998 - 2010	4.95	11.70	7.96
Cyclone Rim	SWSW Section 36 T25N: R96W	1986 - 2010	2.51	8.08	5.04
Echo Springs	NENE Section 6 T17N: R92W	1961 - 1970, 1974 - 2010	4.03	14.74	7.57
Flat Top	SESW Section 31 T15N: R93W	1974 - 1983, 1985 - 2003, 2005 - 2010	3.73	14.50	9.28
LaClede	SWSW Section 30 T18N: R93W	1987 - 2010	3.57	9.26	6.66
Little Robber	SWSW Section 7 T14N: R91W	1961 - 1971, 1974 - 1987, 1989 - 2010	4.28	15.14	9.59
Man and Boy	SESW Section 2 T17N: R95W	1963 - 1964, 1966 - 1972, 1974 - 1976, 1978 - 1982, 1984 - 1988, 1990 - 2010	3.85	10.74	7.14
Mexican Graves	NWSE Section 22 T16N: R93W	1961, 1964 - 1968, 1970 - 1972, 1974 - 1983, 1985 - 1986, 1988 - 2010	5.04	13.33	7.74
Mud Springs	NESW Section 7 T22N: R91W	1986 - 2010	3.55	9.27	6.52
North Tipton	SESW Section 21 T21N: R96W	1987, 1989 - 1994, 1996 - 2002, 2004 - 2010	3.38	8.62	6.24
Tipton	NESE Section 36 T19N: R96W	1986 - 1991, 1993 - 2010	4.50	11.07	8.44
Willow Creek	NWNE Section 32 T16N: R94W	1980 - 1981, 1983, 1986 - 1993, 1997 - 2010	3.16	12.10	7.35
<b>Average for all Gages =</b>					<b>7.54</b>
<b>Minimum Average for all Gages =</b>					<b>3.93</b>
<b>Maximum Average for all Gages =</b>					<b>11.65</b>

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-2. Flow statistics from USGS gaging stations located within and adjacent to the CD-C project area**

Station Name	Station Number	Drainage Area (sq. mi.)	Period of Record	Mean Flow <sup>1</sup> (cfs)	Mean Annual Runoff (ac-ft/yr)	Median Flow <sup>2</sup> (cfs)	Min. Flow <sup>2</sup> (cfs)	Max. Flow (cfs) Date
<b>Upper Green Basin (HUC 140401)</b>								
Bitter Creek	09216545	308	7/1975 – 9/1981	3.7	2,773	1.0	0	333 7/25/1975
<b>White-Yampa Basin (HUC 140500)</b>								
Little Snake River near Dixon	09257000	988	10/1/1910 - 9/30/1923 10/1/1938 – 9/30/1971 4/1/1972 – 9/30/1997 <sup>4</sup>	514	372,355	100	0	10,400 5/16/1984
Muddy Creek near Baggs	09259000	1,257 (1,187) <sup>3</sup>	10/1/1987 - 9/30/1991	14.8	10,675	2.8	0.03	632 3/23/1988
Muddy Creek below Young Draw near Baggs	09258980	1,150	4/17/2004 - 2/15/2011	18.0	13,066	1.1	0.07	499 3/8/2007
<b>Great Divide Basin (HUC 140402)</b>								
Separation Creek near Riner	09216527	53	10/1/1975 - 9/30/1981	1.8	1,300	0	0	76 4/20/1980
Separation Creek at upper station near Riner	09216525	42	7/1/1975 - 9/30/1975	1.3	na	0.8	0.5	21 9/11/1975

<sup>1</sup> Over period of record (cubic feet per second)

<sup>2</sup> Of mean daily values.

<sup>3</sup> Contributing drainage area.

<sup>4</sup> Daily flow measurements were only made from April through October during this time; not included in calculation of mean or median flow.

Source: USGS 2007 and 2011

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-3. Surface water rights and use within 1 mile of the CD-C project area**

SEO Use Designation (As Assigned)	Surface Water Rights
Stock	291
Irrigation; Stock	13
Miscellaneous	13
Irrigation	12
Fish Propagation; Stock; Wetlands; Combined Beneficial Use	6
Reservoir Supply	6
Domestic; Irrigation; Stock	5
Fish Propagation; Stock; Wetlands	4
Industrial	4
Irrigation; Stock; Combined Beneficial Use	4
Industrial; Temporary; Combined Beneficial Use	3
Stock; Wetlands; Combined Beneficial Use	3
Wetlands	3
Flow Through Non-consumptive; Reservoir Supply	2
Unspecified	1
Domestic; Irrigation	1
Domestic; Irrigation; Stock; Combined Beneficial Use	1
Drilling; Industrial; Oil Refining/Production; Temporary	1
Fish Propagation; Flood Control; Stock	1
Fish Propagation; Recreation; Stock; Combined Beneficial Use	1
Fish Propagation; Reservoir Supply	1
Fish Propagation; Stock; Combined Beneficial Use	1
Industrial; Irrigation; Stock; Combined Beneficial Use	1
Irrigation; Reservoir Supply	1
Irrigation; Reservoir Supply; Stock	1
Reservoir Supply; Stock	1
Stock; Wildlife	1
Wildlife	1
<b>Total</b>	<b>383</b>
Use Included in SEO Designation	Surface Water Rights
Stock	334
Irrigation	39
Wetlands	16
Fish Propagation	14
Miscellaneous	13
Reservoir Supply	12
Industrial	9
Domestic	7
Temporary	4
Flow Through Non-consumptive	2
Wildlife	2
Oil Refining/Production	1
Flood Control	1
Recreation	1
Unspecified	1
<b>Total <sup>1</sup></b>	<b>456</b>

<sup>1</sup> Total (456) exceeds the number of permitted surface water rights (383) since individual rights may have multiple uses

Source: SEO 2011

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area**

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
CR08/504	06/26/1974	--	USDI BLM	Toad Stool (Index #4321) Stock Reservoir	STO	013N	091W	4	NW1/4SW1/4	7.24	Toad Stool Draw	41.12476	-107.64740
P18111S	03/20/2006	Fully Adjudicated	--	H & C LLC #4 STOCK RESERVOIR	STO	013N	091W	4	SW1/4SE1/4	--	Sec 4 Draw	41.12064	-107.63786
P7747S	06/26/1974	Fully Adjudicated	--	Toad Stool (Index #4321) Stock Reservoir	STO	013N	091W	4	NW1/4SW1/4	7.24	Toad Stool Draw	41.12526	-107.64723
P18265S	03/20/2006	Fully Adjudicated	--	CHANT #2 STOCK RESERVOIR	STO	013N	091W	5	NE1/4SW1/4	--	Flute Draw	41.12477	-107.66177
P5313R	07/27/1940	Unadjudicated	US DEPARTMENT OF INTERIOR, DIV. OF GRAZING	Cottonwood Reservoir	STO	013N	091W	6	NE1/4NE1/4	96.21	Percy Draw	41.13203	-107.67136
P17348D	03/12/1928	Fully Adjudicated	P.E. POULSON	Muddy Ditch	DOM; IRR	013N	091W	All	--	1.09	Jackson Draws No. 1-2	41.09035	-107.63076
CR11/096	09/27/1985	--	USDI BLM	Detention 1392 #2 Stock Reservoir	STO	013N	092W	1	NW1/4SW1/4	19.18	Cottonwood Creek	41.12479	-107.70489
P9775S	09/27/1985	Fully Adjudicated	--	Detention 1392 #2 Stock Reservoir	STO	013N	092W	1	NW1/4SW1/4	19.18	Cottonwood Creek	41.12544	-107.70593
P11313S	09/11/1991	--	--	Exclosure Stock Reservoir	STO	013N	092W	3	NW1/4NE1/4	3.78	Dogleg Draw	41.13203	-107.73228
P12793S	03/22/1996	--	--	Washout (0312) Stock Reservoir	STO	013N	092W	3	NE1/4SE1/4	2.73	Dogleg Draw	41.12482	-107.72883
CR11/105	09/12/1985	--	USDI BLM	Lost Sheep Stock Reservoir	STO	013N	093W	1	NW1/4SE1/4	3.3	Lost Sheep Gulch	41.12498	-107.80981
P9759S	09/12/1985	Fully Adjudicated	--	Lost Sheep Stock Reservoir	STO	013N	093W	1	NW1/4SE1/4	3.3	Lost Sheep Gulch	41.12351	-107.80949
P11358S	09/09/1991	--	--	McIntosh Stock Reservoir	STO	013N	093W	2	NW1/4NE1/4	4.3	McIntosh Draw	41.13228	-107.82897
P6576S	12/10/1969	Fully Adjudicated	USDI BLM	Rocky Ridge Pit Stock Reservoir	STO	014N	091W	5	SW1/4SE1/4	1.98	Reef Draw	41.20745	-107.65593
CR05/591	12/10/1969	--	USDI BLM	Rocky Ridge Pit Stock Reservoir	STO	014N	091W	5	SW1/4SE1/4	1.98	Reef Draw	41.20812	-107.65678
P6656S	03/09/1970	Fully Adjudicated	USDI BLM	Bottle Stock Reservoir	STO	014N	091W	8	SE1/4NE1/4	1.16	Bottle Draw	41.20114	-107.65244
CR05/588	03/09/1970	--	USDI BLM	Bottle Stock Reservoir	STO	014N	091W	8	SE1/4NE1/4	1.16	Bottle Draw	41.20087	-107.65201
P6655S	03/09/1970	Fully Adjudicated	USDI BLM	Thunder Stock Reservoir	STO	014N	091W	17	SW1/4NE1/4	1.99	Thunder Draw	41.18786	-107.65680
CR05/589	03/09/1970	--	USDI BLM	Thunder Stock Reservoir	STO	014N	091W	17	SW1/4NE1/4	1.99	Thunder Draw	41.18637	-107.65684
CR05/583	12/10/1969	--	USDI BLM	Tangled Chain Pit Stock Reservoir	STO	014N	091W	28	SW1/4NE1/4	1.97	Impossible Draw	41.15738	-107.63772
P17276S	07/26/2004	Fully Adjudicated	--	HICKS STOCK RESERVOIR	STO	014N	091W	32	SE1/4SE1/4	--	--	41.13515	-107.65219
P18054S	03/20/2006	Complete	--	H & C #3 DAM STOCK RESERVOIR	STO	014N	091W	32	--	--	Impossible Draw	41.14108	-107.65936
P6558S	12/08/1969	Fully Adjudicated	USDI BLM	"V" Spreader Pit Stock Reservoir	STO	014N	092W	1	NW1/4SE1/4	0.92	Tom Draw	41.21174	-107.69512

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
CR05/593	12/08/1969	--	USDI BLM	"V" Spreader Pit Stock Reservoir	STO	014N	092W	1	NW1/4SE1/4	0.92	Tom Draw	41.21174	-107.69512
P11322S	09/04/1991	--	--	Big Robber Stock Reservoir	STO	014N	092W	8	SE1/4NW1/4	4.32	Robber Flat Draw	41.20092	-107.77657
P11323S	09/04/1991	--	--	Little Robber Stock Reservoir	STO	014N	092W	12	SE1/4SW1/4	0.45	Robbers Playa Draw	41.19363	-107.69998
P9534R	09/22/1988	Fully Adjudicated	--	Little Robber Detention Dam Reservoir	FIS; STO; COMBBU	014N	092W	14	NW1/4NE1/4	550.58	Little Robbers Gulch	41.18926	-107.71669
CR13/055	09/22/1988	--	USDI BLM	Little Robber Detention Dam Reservoir	FIS; FLO; STO	014N	092W	14	NW1/4NE1/4	550.58	Little Robbers Gulch	41.19001	-107.71438
P11324S	09/04/1991	--	--	Wild Horse Stock Reservoir	STO	014N	092W	15	NW1/4NE1/4	15.76	Wagner Gulch	41.19102	-107.73182
P10331S	10/05/1987	--	--	Big Robber Detention Dam No. 1 Stock Reservoir	STO	014N	092W	17	NE1/4NW1/4	2.50	Muddy Crown Draw	41.19008	-107.77645
P9780S	09/27/1985	Fully Adjudicated	--	Trail Stock Reservoir	STO	014N	092W	20	SW1/4NW1/4	8.40	Little Robbers Gulch	41.17308	-107.78193
CR11/088	09/27/1985	--	USDI BLM	Trail Stock Reservoir	STO	014N	092W	20	SW1/4NW1/4	8.40	Little Robbers Gulch	41.17196	-107.78138
P9756S	09/12/1985	Fully Adjudicated	--	Rattlesnake Stock Reservoir	STO	014N	092W	23	NE1/4NW1/4	14.70	Rattlesnake Draw	41.17428	-107.71776
CR11/089	09/12/1985	--	USDI BLM	Rattlesnake Stock Reservoir	STO	014N	092W	23	NE1/4NW1/4	14.70	Rattlesnake Draw	41.17552	-107.71920
P11325S	09/04/1991	--	--	Detention 1492-3 Stock Reservoir	STO	014N	092W	26	SE1/4SE1/4	5.35	Muddy Creek	41.15114	-107.70937
P11326S	09/04/1991	--	--	Detention 1492 #1 Stock Reservoir	STO	014N	092W	28	NW1/4NE1/4	1.80	North Fork Cottonwood Creek	41.16159	-107.75362
P6563S	12/08/1969	Fully Adjudicated	USDI BLM	Pocket Stock Reservoir	STO	014N	092W	29	SW1/4NE1/4	1.97	Pocket Draw	41.15867	-107.77125
CR05/592	12/08/1969	--	USDI BLM	Pocket Stock Reservoir	STO	014N	092W	29	SW1/4NE1/4	1.97	Pocket Draw	41.15746	-107.77184
P6571S	12/10/1969	Unadjudicated	USDI BLM	Dike View Stock Reservoir	STO	014N	092W	32	NW1/4NE1/4	1.97	Dike View Draw	41.14659	-107.77186
P11314S	09/11/1991	--	--	South Flat Top #2 Stock Reservoir	STO	014N	092W	33	NW1/4SW1/4	7.47	Dogleg Draw	41.13934	-107.76231
P9757S	09/12/1985	Fully Adjudicated	--	Detention Dam 1682 #4 Stock Reservoir	STO	014N	092W	34	NE1/4NE1/4	10.0	Dike View Draw	41.14646	-107.72928
CR11/098	09/12/1985	--	USDI BLM	Detention Dam 1682 #4 Stock Reservoir	STO	014N	092W	34	NE1/4NE1/4	10.0	Dike View Draw	41.14656	-107.72880
P13758S	02/01/2000	Unadjudicated	HOWARD B. LEE FAMILY	Lee Family #1 Stock Reservoir	STO	014N	092W	36	NE1/4SW1/4	--	Lee Draw	41.13930	-107.70008
P7717S	06/26/1974	Fully Adjudicated	USDI BLM	West Flattop (Index #4358) Stock Reservoir	STO	014N	093W	3	SE1/4NW1/4	2.98	South Fork West Flattop Draw	41.21590	-107.85266
CR08/520	06/26/1974	--	USDI BLM	West Flattop (Index #4358) Stock Reservoir	STO	014N	093W	3	SE1/4NW1/4	2.98	South Fork West Flattop Draw	41.21590	-107.85266
P10872S	01/24/1990	Unadjudicated	--	Center Stock Reservoir	STO	014N	093W	10	SE1/4SW1/4	1.01	Upper Hangout Draw	41.19318	-107.85258
P10873S	01/24/1990	Unadjudicated	--	Tip Top Stock Reservoir	STO	014N	093W	13	NW1/4NE1/4	0.95	Upper Top Draw	41.18965	-107.80740
P11332S	09/04/1991	--	--	Morgan Stock Reservoir	STO	014N	093W	14	NE1/4NW1/4	1.86	Morgan Draw	41.18960	-107.83251



## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P11333S	09/04/1991	Unadjudicated	--	SW Flat Top Stock Reservoir	STO	014N	093W	15	SW1/4NE1/4	1.21	Sand Creek	41.18731	-107.84952
P11315S	09/11/1991	--	--	South Flat Top Stock Reservoir	STO	014N	093W	24	SW1/4SE1/4	0.95	Nubs Draw	41.16321	-107.81068
P11327S	09/04/1991	--	--	Standard Road Stock Reservoir	STO	015N	092W	5	SE1/4NW1/4	2.39	Glenarm Creek	41.30154	-107.77559
P11328S	09/04/1991	--	--	South Barrel #5 Stock Reservoir	STO	015N	092W	7	NW1/4NW1/4	1.40	South Barrel Draw	41.29152	-107.79595
P11329S	09/04/1991	--	--	South Muddy #2 Stock Reservoir	STO	015N	092W	11	NW1/4NW1/4	1.71	Highway Mud Wash	41.29141	-107.72390
P19253S	07/17/2009	Incomplete	BLM	BLUE GAP PIT # 3	STO	015N	092W	13	NE1/4SW1/4	--	Pit #3 Draw	41.26795	-107.70164
P9013R	07/05/1985	Unadjudicated	--	Mexican flats Water Disposal Reservoir	IND; TEM; COMBBU	015N	092W	17	SW1/4NE1/4	28.59	Soco Draw	41.27340	-107.77191
P18862S	03/19/2008	Unadjudicated	USDI BLM	Mexican Flats Pit #1 Stock Reservoir	STO	015N	092W	17	SW1/4SE1/4	--	Soco Draw	41.26616	-107.77189
P7721S	06/26/1974	Fully Adjudicated	USDI BLM	Blue Gap (Index #4319) Stock Reservoir	STO	015N	092W	23	NW1/4NE1/4	3.79	Little Blue Gap Draw	41.26254	-107.71440
P9659S	03/25/1985	Fully Adjudicated	--	Blue Gap Pit Stock Reservoir	STO	015N	092W	23	NW1/4NE1/4	3.49	Little Blue Gap Draw	41.26252	-107.71442
CR11/084	03/25/1985	--	USDI BLM	Blue Gap Pit Stock Reservoir	STO	015N	092W	23	NW1/4NE1/4	3.49	Little Blue Gap Draw	41.26245	-107.71428
CR08/518	06/26/1974	--	USDI BLM	Blue Gap (Index #4319) Stock Reservoir	STO	015N	092W	23	NW1/4NE1/4	3.79	Little Blue Gap Draw	41.26245	-107.71428
P19252S	07/17/2009	Incomplete	BUREAU OF LAND MANAGEMENT	BLUE GAP PIT # 4	STO	015N	092W	24	SE1/4NE1/4	--	Pit # 4 Draw	41.25871	-107.69253
P11330S	09/04/1991	--	--	Detention 1592-2 Stock Reservoir	STO	015N	092W	28	SE1/4SW1/4	6.85	Bunny Drop Draw	41.23594	-107.75821
P9781S	09/27/1985	Fully Adjudicated	--	Blue Gap Stock Reservoir	STO	015N	092W	29	NE1/4NW1/4	2.4-	Blue Gap Draw	41.24750	-107.77504
CR11/083	09/27/1985	--	USDI BLM	Blue Gap Stock Reservoir	STO	015N	092W	29	NE1/4NW1/4	2.4-	Blue Gap Draw	41.24807	-107.77664
P9783S	09/27/1985	Fully Adjudicated	--	Dad Larsen Detention 1593 #6 Stock Reservoir	STO	015N	093W	14	SE1/4NE1/4	19.84	West Flattop Draw	41.27213	-107.82611
CR11/091	09/27/1985	--	USDI BLM	Dad Larsen Detention 1593 #6 Stock Reservoir	STO	015N	093W	14	SE1/4NE1/4	19.84	West Flattop Draw	41.27374	-107.82387
P11336S	09/04/1991	--	--	South Barrel #4 Stock Reservoir	STO	015N	093W	15	SE1/4SE1/4	1.37	Upper Painted Draw	41.26637	-107.84379
P7746S	06/26/1974	Fully Adjudicated	USDI BLM	Five Coyote (Index #4352) Stock Reservoir	STO	015N	093W	21	NW1/4SE1/4	5.10	Five Coyote Draw	41.25739	-107.86935
CR08/524	06/26/1974	--	USDI BLM	Five Coyote (Index #4352) Stock Reservoir	STO	015N	093W	21	NW1/4SE1/4	5.10	Five Coyote Draw	41.25576	-107.86700
P7719S	06/26/1974	Fully Adjudicated	USDI BLM	Upper Painted (Index #4354) Stock Reservoir	STO	015N	093W	22	SW1/4SE1/4	2.71	Upper Painted Draw	41.25210	-107.84785

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
CR08/522	06/26/1974	--	USDI BLM	Upper Painted (Index #4354) Stock Reservoir	STO	015N	093W	22	SW1/4SE1/4	2.71	Upper Painted Draw	41.25210	-107.84785
CR08/523	06/26/1974	--	USDI BLM	Lower Painted (Index #4353) Stock Reservoir	STO	015N	093W	22	NW1/4NW1/4	2.98	Lower Painted Draw	41.26299	-107.85743
P11338S	09/04/1991	--	--	Flat Top #1 Stock Reservoir	STO	015N	093W	27	SW1/4NE1/4	3.34	Twin Draw	41.24637	-107.84840
CR08/521	06/26/1974	--	USDI BLM	Upper Twin (Index #4355) Stock Reservoir	STO	015N	093W	33	SE1/4NE1/4	2.98	Twin Draw	41.23039	-107.86219
P10217R	09/07/1995	Fully Adjudicated	Little Snake River Conservation District	Upper Dike Reservoir	STO; WET; COMBBU	016N	092W	5	--	37.4	Muddy Creek	41.38561	-107.76714
P10218R	09/07/1995	Fully Adjudicated	Little Snake River Conservation District	Middle Dike Reservoir	STO; WET; COMBBU	016N	092W	5	--	40.2	Muddy Creek	41.38932	-107.77435
P10219R	09/07/1995	Fully Adjudicated	Little Snake River Conservation District	Lower Dike Reservoir	STO; WET; COMBBU	016N	092W	5	SW1/4SW1/4	159.00	Muddy Creek	41.38098	-107.78042
P16959D	03/13/1925	Unadjudicated	Geo. W. Dew	Dew Ditch No. 1	IRR	016N	092W	5	SE1/4SW1/4	1.42	Muddy Creek	41.38218	-107.77601
P16960D	03/13/1925	Fully Adjudicated	Geo. W. Dew	Dew Ditch No. 2	IRR	016N	092W	5	SE1/4SW1/4	1.97	Muddy Creek	41.38216	-107.77602
P31451D	09/07/1995	Fully Adjudicated	Little Snake River Conservation District	Muddy Creek Duck Pond Ditch	RES	016N	092W	5	--	0.00	Muddy Creek	41.38198	-107.78156
P7403E	05/27/2004	Unadjudicated	Steve F. Adams	Duck Pond #5 Enl. of the Muddy Creek Duck Pond Supply Ditch	FTH; RES	016N	092W	5	--	--	Muddy Creek	41.39887	-107.77767
CC47/312	03/13/1925	--	GEORGE W. DEW	Dew Ditch No. 2	IRR	016N	092W	5	SE1/4SW1/4	0.64	Muddy Creek	41.38198	-107.77675
CC81/089	09/07/1995	--	USDI BLM	Muddy Creek Duck Pond Ditch	RES	016N	092W	5	--	159	Muddy Creek	41.38930	-107.77435
CR14/241	09/07/1995	--	USDI BLM	Upper Dike Reservoir	WET	016N	092W	5	--	2.00	Muddy Creek	41.38930	-107.77435
CR14/242	09/07/1995	--	USDI BLM	Middle Dike Reservoir	WET	016N	092W	5	--	2.00	Muddy Creek	41.38930	-107.77435
CR14/243	09/07/1995	--	USDI BLM	Lower Dike Reservoir	WET	016N	092W	5	SW1/4SW1/4	4.00	Muddy Creek	41.38198	-107.78156
P11760R	05/27/2004	Unadjudicated	--	Duck Pond #5 Reservoir	FIS; STO; WET; COMBBU	016N	092W	8	--	--	Muddy Creek	41.37124	-107.78352
P17154S	07/08/1994	Unadjudicated	--	LSRCD/Weber Pit #1 (West) Stock Reservoir	STO	016N	092W	8	--	--	Muddy Creek	41.37291	-107.77434
P17155S	07/08/1994	Unadjudicated	--	LSRCD/Weber Pit #2 (East) Stock Reservoir	STO	016N	092W	8	--	--	Muddy Creek	41.37291	-107.77434
P6871S	01/25/1971	Fully Adjudicated	USDI BLM	Cedar Stock Reservoir	STO	016N	092W	9	NE1/4NE1/4	0.86	South Cedar Draw	41.37762	-107.74916
CR07/240	01/25/1971	--	USDI BLM	Cedar Stock Reservoir	STO	016N	092W	9	NE1/4NE1/4	0.86	South Cedar Draw	41.37833	-107.74793
P11331S	09/04/1991	--	--	Juniper Ridge Stock Reservoir	STO	016N	092W	10	NE1/4NE1/4	0.23	Dry Cow Creek	41.37832	-107.72870
P11834D	11/17/1904	Unadjudicated	A.T. CORLETT	Corlett Ditch	IRR; STO	016N	092W	17	NE1/4NW1/4	3.78	Muddy Creek	41.36446	-107.77872
P7754D	03/29/1907	Fully Adjudicated	Stephen Adams	Muddy Ditch	IRR	016N	092W	20	SE1/4NE1/4	3.15	Muddy Creek	41.34554	-107.76643

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P11027S	06/04/1990	--	--	Irrigation Ditch Stock Reservoir	STO	016N	092W	21	NW1/4SW1/4	0.15	East Fork Muddy Creek	41.34390	-107.75512
P18716S	10/25/2007	Complete	PATRICK AND JUDITH SHEEHAN	PS-3 STOCK RESERVOIR	STO	016N	092W	28	--	--	PS-3 Draw	41.33306	-107.76408
P10548R	07/22/1997	Fully Adjudicated	--	Red Wash #1 Wetland Reservoir	FIS; STO; WET; COMBBU	016N	092W	29	SE1/4SW1/4	39.68	Little Snake River	41.32396	-107.77673
P7195E	07/08/1997	Fully Adjudicated	--	RED WASH L.H. enl Muddy Ditch	FIS; RES	016N	092W	29	--	3.61	Muddy Creek	--	--
CR15/279	07/22/1997	--	City of Cheyenne, et al.	Red Wash No. 1 Wetland Reservoir	FIS; STO; WET	016N	092W	29	SE1/4SW1/4	39.68	Little Snake River	41.32395	-107.77673
P9620S	03/25/1985	Fully Adjudicated	--	Adobe Cove Pit Stock Reservoir	STO	016N	092W	30	SE1/4NE1/4	0.75	Flats Draw	41.33121	-107.78634
CR11/092	03/25/1985	--	USDI BLM	Adobe Cove Pit Stock Reservoir	STO	016N	092W	30	SE1/4NE1/4	0.75	Flats Draw	41.33121	-107.78634
P10549R	07/22/1997	Fully Adjudicated	--	Red Wash #4 Wetland Reservoir	FIS; STO; WET; COMBBU	016N	092W	31	NE1/4NE1/4	21.4	Flats Draw	41.32033	-107.78634
CR15/280	07/22/1997	--	City of Cheyenne, et al.	Red Wash No. 4 Wetland Reservoir	FIS; STO; WET	016N	092W	31	NE1/4NE1/4	21.4	Flats Draw	41.32033	-107.78634
P10546R	07/08/1997	Fully Adjudicated	--	Red Wash #2 Wetland Reservoir	FIS; STO; WET; COMBBU	016N	092W	32	SW1/4NE1/4	143.36	Little Snake River	41.31670	-107.77192
P10547R	07/08/1997	Fully Adjudicated	--	Red Wash #3 Wetland Reservoir	FIS; STO; WET; COMBBU	016N	092W	32	SW1/4NE1/4	8.10	Little Snake River	41.31670	-107.77192
P11367R	05/31/2002	Unadjudicated	--	RED WASH #5 WETLAND Reservoir	FIS; STO; WET; COMBBU	016N	092W	32	SE1/4NE1/4	--	Muddy Creek	41.31617	-107.76733
P7346E	05/31/2002	Unadjudicated	USDI BLM	RED WASH SECOND ENL. MUDDY DITCH (#7754)	FTH; RES	016N	092W	32	NE1/4NE1/4	--	Muddy Creek	--	--
CR15/277	07/08/1997	--	City of Cheyenne, et al.	Red Wash No. 2 Wetland Reservoir	FIS; STO; WET	016N	092W	32	SW1/4NE1/4	143.36	Little Snake River	41.31670	-107.77192
CR15/278	07/08/1997	--	City of Cheyenne, et al.	Red Wash No. 3 Wetland Reservoir	FIS; STO; WET	016N	092W	32	SW1/4NE1/4	8.10	Little Snake River	41.31670	-107.77192
P11029S	06/04/1990	--	--	Northwest Border Stock Reservoir	STO	016N	092W	34	NW1/4NW1/4	1.37	Northwest Border Draw	41.32033	-107.74311
P12671S	11/08/1995	--	--	Niland No. 1 (5521) Stock Reservoir	STO	016N	092W	35	NW1/4SE1/4	0.36	Muddy Creek	41.31209	-107.71588
CC82/147	07/08/1997	--	City of Cheyenne, Board of Public Utilities, et al.	Muddy Ditch, Enl.	RES	016N	092W	--	--	212.00	Muddy Creek	41.35295	-107.74499
P10867S	01/24/1990	Unadjudicated	--	Clay Flat Stock Reservoir	STO	016N	093W	1	NE1/4NW1/4	1.29	Doty Draw	41.39731	-107.81433

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P9621S	03/25/1985	Fully Adjudicated	--	No. Barrel Springs Pit Stock Reservoir	STO	016N	093W	9	NW1/4NW1/4	0.74	Red Draw	41.37914	-107.87662
CR11/094	03/25/1985	--	USDI BLM	No. Barrel Springs Pit Stock Reservoir	STO	016N	093W	9	NW1/4NW1/4	0.74	Red Draw	41.37914	-107.87661
P12702R	10/31/2005	Complete	DOUBLE EAGLE PETROLEUM CO.	LSRCD SECTION 13 RESERVOIR		016N	093W	13	NE1/4NW1/4	--	Blue Eagle Creek	41.36433	-107.81411
P10521S	12/19/1988	--	--	Lower Windmill	STO	016N	093W	17	NE1/4SW1/4	0.15	Folly Draw	41.35608	-107.88934
P6914S	01/25/1971	Fully Adjudicated	USDI BLM	Mexican Flats No. 2 Stock Reservoir	STO	016N	093W	17	NW1/4NE1/4	1.3	Herder Draw	41.36370	-107.88624
CR06/160	01/25/1971	--	USDI BLM	Mexican Flats No. 2 Stock Reservoir	STO	016N	093W	17	NW1/4NE1/4	1.3	Herder Draw	41.36467	-107.88622
P10523S	12/19/1988	--	--	Mexican Graves Stock Reservoir	STO	016N	093W	19	SE1/4NW1/4	2.78	Herder Draw	41.34661	-107.91025
P6573S	12/10/1969	Fully Adjudicated	USDI BLM	Mexican Flats No. 3 Stock Reservoir	STO	016N	093W	22	NE1/4NE1/4	1.68	Tick Draw	41.35108	-107.84311
CR05/597	12/10/1969	--	USDI BLM	Mexican Flats No. 3 Stock Reservoir	STO	016N	093W	22	NE1/4NE1/4	1.68	Tick Draw	41.34992	-107.84313
P9622S	03/25/1985	Fully Adjudicated	--	Lone Pit Stock Reservoir	STO	016N	093W	25	SE1/4SE1/4	3.23	Barrel Springs Draw	41.32435	-107.80459
CR11/090	03/25/1985	--	USDI BLM	Lone Pit Stock Reservoir	STO	016N	093W	25	SE1/4SE1/4	3.23	Barrel Springs Draw	41.32435	-107.80459
P6572S	12/10/1969	Fully Adjudicated	USDI BLM	Mexican Flats No. 1 Stock Reservoir	STO	016N	093W	29	NE1/4SE1/4	1.30	Beatle Draw	41.32778	-107.88022
CR05/596	12/10/1969	--	USDI BLM	Mexican Flats No. 1 Stock Reservoir	STO	016N	093W	29	NE1/4SE1/4	1.30	Beatle Draw	41.32832	-107.88130
P11316S	09/11/1991	--	--	Mexican Flats Stock Reservoir	STO	016N	093W	33	SW1/4SE1/4	8.81	Mexican Flats Draw	41.30858	-107.86857
P11340S	09/04/1991	--	--	South Border Stock Reservoir	STO	016N	093W	35	NW1/4SW1/4	2.34	South Barrel Springs Draw	41.31361	-107.83818
P9623S	03/25/1985	Fully Adjudicated	--	Barrel Spings Draw Pit Stock Reservoir	STO	016N	094W	12	SE1/4SW1/4	0.74	Barrel Springs Draw	41.36847	-107.92888
CR11/093	03/25/1985	--	USDI BLM	Barrel Springs Draw Pit Stock Reservoir	STO	016N	094W	12	SE1/4SW1/4	0.74	Barrel Springs Draw	41.36847	-107.92888
P11360S	09/09/1991	--	--	Windmill Draw Stock Reservoir	STO	016N	094W	25	NE1/4NW1/4	2.34	Herder Draw	41.33577	-107.92889
P10564S	12/29/1988	--	--	Pit 1694 #1 Stock Reservoir	STO	016N	094W	27	NE1/4SE1/4	0.86	Wild Rube Draw	41.32719	-107.95589
P11062S	08/09/1990	--	--	Crosby Stock Reservoir	STO	016N	095W	27	NW1/4NE1/4	2.14	Willow Draw	41.33780	-108.07838
P4904S	12/16/1963	Fully Adjudicated	P.S.(SID) WEBER	West Fork No. 3 Stock Reservoir	STO	017N	091W	19	SW1/4SE1/4	1.17	Broken Hitch Wash	41.42814	-107.68782
CR05/034	12/16/1963	--	P.S. (SID) WEBER	West Fork No. 3 Stock Reservoir	STO	017N	091W	19	SW1/4SE1/4	1.17	Broken Hitch Wash	41.42816	-107.68782
P17152S	07/08/1994	Unadjudicated	--	Washakie Stock Reservoir	STO	017N	092W	5	SW1/4NE1/4	--	Washakie Draw	41.47925	-107.78397
P10710S	05/17/1989	--	--	Quit Claim Stock Reservoir	STO	017N	092W	8	SE1/4NW1/4	3.19	Quit Draw	41.46393	-107.79108

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P12672S	11/08/1995	--	--	Pine Butte (5309) Stock Reservoir	STO	017N	092W	10	NE1/4SW1/4	3.29	Antelope Creek	41.45967	-107.74959
P25633D	01/21/1977	Unadjudicated	Steve F. Adams	Adams Portable Pump Irrigation System No. 1	IRR	017N	092W	14	NE1/4NW1/4	0.48	Muddy Creek	41.45439	-107.73296
P25634D	01/21/1977	Fully Adjudicated	Steve F. Adams	Adams Portable Pump Irrigation System #2	IRR	017N	092W	15	SE1/4NE1/4	0.21	Muddy Creek	41.44946	-107.74029
P25635D	01/21/1977	Fully Adjudicated	Steve F. Adams	Adams Portable Pump Irrigation System No. 3	IRR	017N	092W	15	NW1/4SE1/4	0.43	Muddy Creek	41.44648	-107.74680
P25636D	01/21/1977	Fully Adjudicated	Steve F. Adams	Adams Portable Pump Irrigation System # 4	IRR	017N	092W	15	SE1/4SW1/4	0.44	Muddy Creek	41.44310	-107.75151
CC73/279	01/21/1977	--	HERBERT H. KOHL	Adams Portable Pump Irrigation System #2	IRR	017N	092W	15	SE1/4NE1/4	0.21	Muddy Creek	41.44969	-107.74149
CC73/280	01/21/1977	--	HERBERT H. KOHL	Adams Portable Pump Irrigation System No. 3	IRR	017N	092W	15	NW1/4SE1/4	0.44	Muddy Creek	41.44610	-107.74627
CC73/281	01/21/1977	--	HERBERT H. KOHL	Adams Portable Pump Irrigation System # 4	IRR	017N	092W	15	SE1/4SW1/4	0.45	Muddy Creek	41.44250	-107.75107
P11159S	11/01/1990	Fully Adjudicated	Weber Ranch Inc.	Tree Stock Reservoir	STO	017N	092W	19	SW1/4NW1/4	4.40	Little Coal Gulch	41.43399	-107.80557
CR13/215	11/01/1990		WEBER RANCH COMPANY	Tree Stock Reservoir	STO	017N	092W	19	SW1/4NW1/4	4.40	Little Coal Gulch	41.43630	-107.81233
P11011S	07/12/1990	Unadjudicated	--	South Baldy Butte Stock Reservoir	STO	017N	092W	20	SW1/4SE1/4	2.43	Baldy Draw	--	--
P11012S	07/12/1990	Unadjudicated	--	West Doty #5 Stock Reservoir	STO	017N	092W	20	SW1/4SE1/4	1.43	Doty No. 2 Draw	41.42764	-107.78577
P11158S	11/01/1990	Fully Adjudicated	--	Salisbury Stock Reservoir	STO	017N	092W	25	SW1/4NE1/4	3.32	Phillip Draw	41.42211	-107.70676
CR13/214	11/01/1990	--	SAM SCOTT, ET AL.	Salisbury Stock Reservoir	STO	017N	092W	25	SW1/4NE1/4	3.32	Phillip Draw	41.42129	-107.70707
P794S	04/01/1954	Unadjudicated	--	Cedar Draw Pit Stock Reservoir	STO	017N	092W	33	SW1/4SW1/4	6.08	Cedar Draw	41.40010	-107.77363
P11061S	08/09/1990	--	--	Electric Well Stock Reservoir	STO	017N	092W	34	NE1/4NE1/4	1.64	Upper Electric Well Draw	41.41045	-107.74063
P10560S	12/29/1988	--	--	West Doty No. 4 Stock Reservoir	STO	017N	093W	10	SW1/4SE1/4	16.10	Swigger Draw	41.45805	-107.86034
P10525S	12/19/1988	--	--	Big Flat Stock Reservoir	STO	017N	093W	12	SE1/4SE1/4	0.39	Cloverleaf Ridge Draw	41.45688	-107.81632
P1051S	01/11/1955	--	EUREKA SHEEP CO.	Eureka #7 Stock Reservoir	STO	017N	093W	17	SW1/4NW1/4	2.74	North Barrel Springs	41.45115	-107.90802
P10522S	12/19/1988	--	--	LaCiede No. 2 Stock Reservoir	STO	017N	093W	26	SE1/4SW1/4	1.18	Barrell Springs Draw	41.41293	-107.84667
P11013S	07/12/1990	Unadjudicated	--	West Doty #2 Stock Reservoir	STO	017N	093W	36	NE1/4NE1/4	17.7	Big Doty Draw	41.41085	-107.81757
P10338S	10/08/1987	--	--	Adam's Pit No. 1 Stock Reservoir	STO	017N	094W	6	SE1/4NW1/4	3.12	North Barrel Springs Draw	41.48017	-108.03766

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P12670S	11/08/1995	--	--	Overland #1 (0272) Stock Reservoir	STO	017N	094W	14	SW1/4SW1/4	1.38	North Barrel Springs Draw	41.44319	-107.96360
P7716S	06/26/1974	Fully Adjudicated	USDI BLM	Barrel (Index #4370) Stock Reservoir	STO	017N	095W	2	NW1/4NE1/4	4.43	North Barrel Springs Draw	41.48373	-108.07124
CR08/525	06/26/1974	--	USDI BLM	Barrel (Index #4370) Stock Reservoir	STO	017N	095W	2	NW1/4NE1/4	4.43	North Barrel Springs Draw	41.48373	-108.07124
P10350S	12/07/1987	--	--	Pit 1795 A Stock Reservoir	STO	017N	095W	14	SE1/4NW1/4	0.3	Little Rose Draw	41.45276	-108.07469
P7776S	06/26/1974	Fully Adjudicated	USDI BLM	Boy (Index #4367) Stock Reservoir	STO	017N	095W	16	NE1/4NW1/4	5.51	Wild Rose Draw	41.45483	-108.11455
CR08/529	06/26/1974	--	USDI BLM	Boy (Index #4367) Stock Reservoir	STO	017N	095W	16	NE1/4NW1/4	5.51	Wild Rose Draw	41.45483	-108.11455
P10869S	01/24/1990	Unadjudicated	--	1795 B Stock Reservoir	STO	017N	095W	22	NE1/4SE1/4	0.87	Trail Wash	41.43349	-108.08533
P7775S	06/26/1974	Fully Adjudicated	USDI BLM	Little Draw (Index #4368) Stock Reservoir	STO	017N	095W	36	SW1/4NW1/4	2.84	Mulligan Draw	41.40792	-108.06192
CR08/528	06/26/1974	--	USDI BLM	Little Draw (Index #4368) Stock Reservoir	STO	017N	095W	36	SW1/4NW1/4	2.84	Mulligan Draw	41.40791	-108.06192
P9774S	09/27/1985	Fully Adjudicated	--	Badwater #6 Stock Reservoir	STO	018N	091W	6	NE1/4NE1/4	19.76	Bad Water Creek	41.56942	-107.68348
CR11/067	09/27/1985	--	USDI BLM	Badwater #6 Stock Reservoir	STO	018N	091W	6		19.76	Bad Water Creek	41.56478	-107.69011
P10131S	03/02/1981	Unadjudicated	Niels Hansen	P. H. Fourteen Stock Reservoir	STO	018N	091W	11	NE1/4NE1/4	2.69	PH Fourteen Draw	41.55572	-107.60602
P9755S	09/12/1985	Fully Adjudicated	--	Badwater #7 Stock Reservoir	STO	018N	091W	18	NE1/4SE1/4	2.28	Holler Draw	41.53383	-107.68421
CR11/087	09/12/1985	--	USDI BLM	Badwater #7 Stock Reservoir	STO	018N	091W	18	NE1/4SE1/4	2.28	Holler Draw	41.53413	-107.68286
P11355S	09/09/1991	--	--	Badwater #8 Stock Reservoir	STO	018N	091W	20	SE1/4SW1/4	1.37	South Divide Wash	41.51607	-107.67305
P10132S	03/02/1981	Unadjudicated	Niels Hansen	Chicken Springs Stock Reservoir	STO	018N	091W	21	SW1/4SE1/4	0.59	Chicken Spring Wash	41.51672	-107.65048
P11070S	09/06/1990	--	--	Badwater #10 Stock Reservoir	STO	018N	091W	22	SW1/4SW1/4	0.48	Chicken Spring Wash	41.51486	-107.64086
P11069S	09/06/1990	--	--	Badwater #11 Stock Reservoir	STO	018N	091W	28	SE1/4NW1/4	0.71	Lower Chicken Springs Wash	41.50769	-107.65188
P11074S	09/06/1990	--	--	Badwater #13 Stock Reservoir	STO	018N	091W	30	SE1/4SE1/4	1.93	Upper Badwater Draw	41.50155	-107.68264
P11356S	09/09/1991	--	--	Badwater #14 Stock Reservoir	STO	018N	091W	30	SE1/4NE1/4	0.07	Upper Badwater Draw	41.50882	-107.68266
P10713S	05/17/1989	--	--	Sugar Loaf Stock Reservoir	STO	018N	092W	4	NW1/4SW1/4	0.67	SUGAR WASH	41.56299	-107.77381
P6712S	04/27/1970	Fully Adjudicated	USDI BLM	Continental Stock Reservoir	STO	018N	092W	12	NE1/4NE1/4	2.21	Fan Draw	41.55653	-107.70093
CR06/131	04/27/1970	--	USDI BLM	Continental Stock Reservoir	STO	018N	092W	12	NE1/4NE1/4	2.21	Fan Draw	41.55573	-107.70200

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P8949S	10/16/1981	Fully Adjudicated	--	13-18-92 No. 1 Stock Reservoir	STO	018N	092W	13	SW1/4NW1/4	0.78	West Fork Holler Draw	41.53710	-107.71801
CR09/297	10/16/1981	--	DOM ECHEVERRIA TRUST	13-18-92 No. 1 Stock Reservoir	STO	018N	092W	13	SW1/4NW1/4	0.78	West Fork Holler Draw	41.53763	-107.71626
P8947S	10/16/1981	Fully Adjudicated	--	15-18-92 No. 2 Stock Reservoir	STO	018N	092W	15	SW1/4NW1/4	1.32	Echeverria Draw	41.53634	-107.75448
P8948S	10/16/1981	Fully Adjudicated	--	15-18-92 No. 1 Stock Reservoir	STO	018N	092W	15	SE1/4SE1/4	2.80	South Fork Coal Gulch	41.53108	-107.73866
CR09/294	10/16/1981	--	DOM ECHEVERRIA TRUST	15-18-92 No. 1 Stock Reservoir	STO	018N	092W	15	SE1/4SE1/4	2.80	South Fork Coal Gulch	41.53034	-107.74012
CR09/295	10/16/1981	--	DOM ECHEVERRIA TRUST	15-18-92 No. 2 Stock Reservoir	STO	018N	092W	15	SW1/4NW1/4	1.32	Echeverria Draw	41.53753	-107.75458
P10780S	05/17/1989	--	--	South Echo #4 Stock Reservoir	STO	018N	092W	18	NE1/4NE1/4	0.30	North Divide Draw	41.54201	-107.79875
P8945S	10/16/1981	Fully Adjudicated	--	21-18-92 No. 1 Stock Reservoir	STO	018N	092W	21	SW1/4NW1/4	0.22	South Fork Coal Gulch	41.52158	-107.77484
CR09/293	10/16/1981	--	DOM ECHEVERRIA TRUST	21-18-92 No. 1 Stock Reservoir	STO	018N	092W	21	SW1/4NW1/4	0.22	South Fork Coal Gulch	41.52294	-107.77371
P10711S	05/17/1989	--	--	Upper Coal Gulch Stock Reservoir	STO	018N	092W	22	NW1/4NW1/4	1.52	South Fork Coal Gulch	41.52691	-107.75489
P9758S	09/12/1985	Fully Adjudicated	--	Double Cove Stock Reservoir	STO	018N	092W	26	SW1/4NE1/4	3.02	Double Cove	41.50869	-107.72623
CR11/086	09/12/1985	--	USDI BLM	Double Cove Stock Reservoir	STO	018N	092W	26	SW1/4NE1/4	3.02	Double Cove	41.50865	-107.72583
P10559S	12/29/1988	--	--	South Echo No. 2 Stock Reservoir	STO	018N	092W	28	SW1/4SE1/4	3.48	Echo Draw	41.50111	-107.76265
P8944S	10/16/1981	Fully Adjudicated	--	29-18-92 No. 1 Stock Reservoir	STO	018N	092W	29	SE1/4SW1/4	0.37	Sage Chicken Draw	41.50228	-107.78877
CR09/292	10/16/1981	--	DOM ECHEVERRIA TRUST	29-18-92 No. 1 Stock Reservoir	STO	018N	092W	29	SE1/4SW1/4	0.37	Sage Chicken Draw	41.50110	-107.78811
P11109S	08/23/1990	--	--	South Echo #1 Stock Reservoir	STO	018N	092W	30	SE1/4SE1/4	2.45	Upper Echo Draw	41.49957	-107.79690
P9782S	09/27/1985	Fully Adjudicated	--	Upper Soap Hole Stock Reservoir	STO	018N	092W	34	SE1/4NE1/4	7.21	Soap Hole Wash	41.49357	-107.74245
CR11/085	09/27/1985	--	USDI BLM	Upper Soap Hole Stock Reservoir	STO	018N	092W	34	SE1/4NE1/4	7.21	Soap Hole Wash	41.49415	-107.74022
P10779S	05/17/1989	--	--	Lower Coal Bank Stock Reservoir	STO	018N	093W	10	SE1/4SW1/4	2.45	Lower Coal Bank Wash	41.54394	-107.86459
P8951S	10/16/1981	Fully Adjudicated	--	11-18-93 No. 1 Stock Reservoir	STO	018N	093W	11	SW1/4NE1/4	0.96	Coal Bank Wash	41.55218	-107.84051
CR09/274	10/16/1981	--	DOM ECHEVERRIA TRUST	11-18-93 No. 1 Stock Reservoir	STO	018N	093W	11	SW1/4NE1/4	0.96	Coal Bank Wash	41.55240	-107.84064

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P5245R	02/10/1940	Fully Adjudicated	US DEPARTMENT OF INTERIOR, DIV. OF GRAZING	Government No. 1 Reservoir	STO	018N	093W	17	SE1/4NE1/4	98.57	Government Draw No. 1	41.53710	-107.89336
CR12/366	02/10/1940	--	USDI BLM	Government No. 1 Reservoir	STO	018N	093W	17	SE1/4NE1/4	98.57	Government Draw No. 1	41.53819	-107.89393
P8515S	09/12/1978	Fully Adjudicated	Union Pacific Railroad	Elwood Stock Reservoir	STO	018N	093W	21	NE1/4NE1/4	2.60	Government Draw No. 1	41.52695	-107.87442
CR08/612	09/12/1978	--	STEVE F. ADAMS	Elwood Stock Reservoir	STO	018N	093W	21	NE1/4NE1/4	2.60	Government Draw No. 1	41.52693	-107.87442
P8950S	10/16/1981	Fully Adjudicated	--	25-18-93 No. 1 Stock Reservoir	STO	018N	093W	25	SW1/4SE1/4	0.53	Sheephead Draw	41.50163	-107.82179
CR09/296	10/16/1981	--	DOM ECHEVERRIA TRUST	25-18-93 No. 1 Stock Reservoir	STO	018N	093W	25	SW1/4SE1/4	0.53	Sheephead Draw	41.50163	-107.82179
P10699S	03/31/1989	--	--	Coal Gulch No. 2 Stock Reservoir	STO	018N	093W	26	SW1/4SW1/4	0.94	Barrell Springs Draw	41.50194	-107.85126
P7760S	06/26/1974	Fully Adjudicated	USDI BLM	Twelvemile (Index #4318) Stock Reservoir	STO	018N	093W	30	NW1/4NE1/4	3.56	Coal Bank Lake Draw	41.51322	-107.91910
CR08/480	06/26/1974	--	USDI BLM	Twelvemile (Index #4318) Stock Reservoir	STO	018N	093W	30	NW1/4NE1/4	3.56	Coal Bank Lake Draw	41.51284	-107.91780
P7741S	06/26/1974	Fully Adjudicated	USDI BLM	Red Lake (Index #4342) Stock Reservoir	STO	018N	094W	8	NE1/4NE1/4	3.22	Corral Draw	41.55662	-108.00937
CR08/080	06/26/1974	--	USDI BLM	Red Lake (Index #4342) Stock Reservoir	STO	018N	094W	8	NE1/4NE1/4	3.22	Corral Draw	41.55627	-108.00954
P10333S	10/05/1987	--	--	Adam's Pit No. 2 Stock Reservoir	STO	018N	094W	20	NW1/4SW1/4	2.25	RED MIRAGE DRAW	41.51993	-108.02380
P7777S	06/26/1974	Fully Adjudicated	USDI BLM	Stratton NW (Index #4365) Stock Reservoir	STO	018N	095W	6	SW1/4NW1/4	3.47	Upper Rim Draw	41.57030	-108.15317
CR08/527	06/26/1974	--	USDI BLM	Stratton NW (Index #4365) Stock Reservoir	STO	018N	095W	6	SW1/4NW1/4	3.47	Upper Rim Draw	41.56666	-108.15833
P7745S	06/26/1974	Fully Adjudicated	USDI BLM	Two Draw (Index #4366) Stock Reservoir	STO	018N	095W	8	SW1/4SE1/4	19.45	Upper Rim Draw	41.54501	-108.12970
CR08/526	06/26/1974	--	USDI BLM	Two Draw (Index #4366) Stock Reservoir	STO	018N	095W	8	SW1/4SE1/4	19.45	Upper Rim Draw	41.54501	-108.12970
P7750S	06/26/1974	Fully Adjudicated	USDI BLM	Delaney Rim (Index #4369) Stock Reservoir	STO	018N	095W	26	SW1/4NW1/4	2.39	East Wash	41.50907	-108.08131
CR08/530	06/26/1974	--	USDI BLM	Delaney Rim (Index #4369) Stock Reservoir	STO	018N	095W	26	SW1/4NW1/4	2.39	East Wash	41.50907	-108.08131
P3834S	11/27/1961	Unadjudicated	P H Livestock Co.	Hansen Stock Reservoir	STO	018N	096W	9	SW1/4SW1/4	1.78	Bitter Creek (drainage of)	41.54399	-108.23700
P7780S	06/26/1974	Fully Adjudicated	USDI BLM	Rabbit Brush (Index #4349) Stock Reservoir	STO	018N	096W	10	NE1/4SE1/4	2.98	Rabbit Brush Draw	41.54887	-108.20161
CR08/532	06/26/1974	--	USDI BLM	Rabbit Brush (Index #4349) Stock Reservoir	STO	018N	096W	10	NE1/4SE1/4	2.98	Rabbit Brush Draw	41.54886	-108.20161



## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P4387S	08/22/1961	Incomplete	--	DALEY DAM STOCK RESERVOIR	STO	018N	096W	18	SE1/4NW1/4	8.70	Bitter Creek (drainage of)	41.53789	-108.27154
P12969S	10/17/1997	Fully Adjudicated	PH Livestock Co.	Barrel Springs Stock Reservoir	STO	018N	096W	25	SW1/4NE1/4	4.03	Hansen Draw	41.50709	-108.17030
CR15/218	10/17/1997	--	PH Livestock Company	Barrel Springs Stock Reservoir	STO	018N	096W	25	SW1/4NE1/4	4.03	Hansen Draw	41.50887	-108.16785
P7740S	06/26/1974	Fully Adjudicated	USDI BLM	Rocky Point (Index #4348) Stock Reservoir	STO	018N	096W	30	SW1/4SE1/4	2.98	Laney Wash	41.50187	-108.26387
CR08/075	06/26/1974	--	USDI BLM	Rocky Point (Index #4348) Stock Reservoir	STO	018N	096W	30	SW1/4SE1/4	2.98	Laney Wash	41.50187	-108.26387
P12968S	10/17/1997	Fully Adjudicated	PH Livestock Co.	PH Man & Boy Stock Reservoir	STO	018N	096W	35	SE1/4NE1/4	4.03	Ph Draw	41.49265	-108.18946
P7779S	06/26/1974	Fully Adjudicated	USDI BLM	Man and The Boy (Index #4350) Stock Reservoir	STO	018N	096W	36	NW1/4NE1/4	2.95	Man and the Boy Draw	41.49809	-108.16776
CR08/531	06/26/1974	--	USDI BLM	Man and The Boy (Index #4350) Stock Reservoir	STO	018N	096W	36	NW1/4NE1/4	2.95	Man and the Boy Draw	41.49808	-108.16776
UW03/071	01/22/1974	Fully Adjudicated	THE TEXAS COMPANY	TABLE ROCK UNIT WATER WELL NO. 5	MIS	018N	098W	1	NW1/4NE1/4	13.0	--	41.57122	-108.39575
P10675S	03/31/1989	--	--	Horse Butte Stock Reservoir	STO	019N	091W	6	SE1/4NE1/4	0.95	No Job Draaw	41.65134	-107.68346
P10136S	03/02/1981	Unadjudicated	Niels Hansen	PH Twelve Stock Reservoir	STO	019N	091W	25	SW1/4SE1/4	0.45	PH Twelve Draw	41.58686	-107.59370
P11346S	09/09/1991	--	--	Fillmore Bend Stock Reservoir	STO	019N	091W	26	SE1/4NW1/4	2.57	Fillmore Creek	41.59436	-107.61618
P11312S	09/11/1991	--	--	Badwater #3 Stock Reservoir	STO	019N	091W	30	SW1/4SW1/4	2.29	North Divide Draw	41.59533	-107.68361
P11347S	09/09/1991	Unadjudicated	--	Badwater #5 Stock Reservoir	STO	019N	091W	32	NW1/4SW1/4	1.09	Bad Water Creek	41.57774	-107.67880
P10137S	03/02/1981	Unadjudicated	Niels Hansen	Fillmore Creek Stock Reservoir	STO	019N	091W	35	SW1/4SE1/4	1.38	Fillmore Creek	41.57811	-107.61407
P11348S	09/09/1991	--	--	Lazy YS Stock Reservoir	STO	019N	092W	4	NW1/4NW1/4	0.37	County Line Draw	41.65298	-107.76052
P12162S	08/25/1994	Fully Adjudicated	Duane & Deborah Rodewald	Section 11 Stock Reservoir	STO	019N	092W	11	NW1/4NE1/4	0.08	Separation Lake	41.64228	-107.72668
CR14/215	08/25/1994	--	THOMAS F DAVENPORT, JR.	Section 25 East Stock Reservoir	STO	019N	092W	11	NW1/4NE1/4	0.08	Rodewald Draw	41.64228	-107.72668
P7467R	06/21/1972	Unadjudicated	--	Seaverson Reservoir	FIS; REC; STO; COMBBU	019N	092W	24	NW1/4NE1/4	335.8	FILLMORE/FILMORE CREEK	41.61347	-107.70679
P12163S	08/25/1994	Fully Adjudicated	Duane & Deborah Rodewald	Section 25 East Stock Reservoir	STO	019N	092W	25	SE1/4NE1/4	0.08	Rodewald Draw	41.59537	-107.70237
P12164S	08/25/1994	Fully Adjudicated	Duane & Deborah Rodewald	Section 25 West Stock Reservoir	STO	019N	092W	25	SE1/4NE1/4	0.08	Rodewald Draw	41.59537	-107.70237
CR14/216	08/25/1994	--	THOMAS F DAVENPORT, JR.	Section 25 West Stock Reservoir	STO	019N	092W	25	SE1/4NE1/4	0.08	Rodewald Draw	41.59538	-107.70237

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P12165S	08/25/1994	Fully Adjudicated	Duane & Deborah Rodewald	Section 35 East Stock Reservoir	STO	019N	092W	35	NE1/4SE1/4	0.08	Separation Lake	41.57739	-107.72114
P12166S	08/25/1994	Fully Adjudicated	Duane & Deborah Rodewald	Section 35 West Stock Reservoir	STO	019N	092W	35	SW1/4NE1/4	0.08	Separation Lake	41.58081	-107.72611
CR14/217	08/25/1994	--	THOMAS F DAVENPORT, JR.	Section 35 East Stock Reservoir	STO	019N	092W	35	NE1/4SE1/4	0.08	Separation Lake	41.57738	-107.72114
CR14/218	08/25/1994	--	THOMAS F DAVENPORT, JR.	Section 35 West Stock Reservoir	STO	019N	092W	35	SW1/4NE1/4	0.08	Separation Lake	41.58082	-107.72611
P6715S	04/27/1970	Fully Adjudicated	USDI BLM	Northwest Echo Stock Reservoir	STO	019N	093W	6	NW1/4NE1/4	3.18	Dry Lake Bed	41.65745	-107.91932
CR06/134	04/27/1970	--	USDI BLM	Northwest Echo Stock Reservoir	STO	019N	093W	6	NW1/4NE1/4	3.18	Dry Lake Bed	41.65752	-107.91854
P6713S	04/27/1970	Fully Adjudicated	USDI BLM	East Echo Stock Reservoir	STO	019N	093W	14	SE1/4SE1/4	2.84	Echo Springs Draw	41.61691	-107.83794
CR06/132	04/27/1970	--	USDI BLM	East Echo Stock Reservoir	STO	019N	093W	14	SE1/4SE1/4	2.84	Echo Springs Draw	41.61735	-107.83693
P11127R	04/12/2001	Unadjudicated	Samson Resources Co.	Crystal Solutions FTE Reservoir	IND; IRR; STO; COMBBU	019N	093W	19	SW1/4SE1/4	--	Adams Draw	--	--
P12785R	11/24/2006	Complete	SAMSON RESOURCES	HOLDING POND 5-6 RESERVOIR	IND	019N	093W	19	NW1/4SE1/4	--	Adams Draw	41.60682	-107.91819
P6714S	04/27/1970	Fully Adjudicated	USDI BLM	West Echo Stock Reservoir	STO	019N	093W	20	SE1/4SE1/4	2.97	Echo Springs Draw	41.60465	-107.89482
CR06/133	04/27/1970	--	USDI BLM	West Echo Stock Reservoir	STO	019N	093W	20	SE1/4SE1/4	2.97	Echo Springs Draw	41.60307	-107.89423
P10877S	01/24/1990	--	--	Horse Pasture Draw Stock Reservoir	STO	019N	093W	26	NE1/4SW1/4	2.51	Horse Pasture Draw	41.59249	-107.84583
P8521S	09/25/1978	Fully Adjudicated	Stephen L. Adams	Adams #1B Stock Reservoir	STO	019N	093W	31	SE1/4NW1/4	2.71	Standard Draw	41.58245	-107.92498
CR10/214	09/25/1978	--	STEVE F. ADAMS	Adams #1B Stock Reservoir	STO	019N	093W	31	SE1/4NW1/4	2.71	Standard Draw	41.58158	-107.92288
P11367S	09/09/1991	--	--	West 44 - Echo Stock Reservoir	STO	019N	093W	36	NE1/4NE1/4	0.36	Standard Draw	41.58412	-107.81514
P8046S	10/16/1975	Fully Adjudicated	--	Wamsutter Stock Reservoir	STO	019N	094W	3	NE1/4SW1/4	2.34	LATHAM DRAW	41.65015	-107.98043
CR08/435	10/16/1975	--	UNION PACIFIC LAND RESOURCES CORP	Wamsutter Stock Reservoir	STO	019N	094W	3	NE1/4SW1/4	2.34	LATHAM DRAW	41.65015	-107.98043
P8045S	10/16/1975	Fully Adjudicated	--	Frewen Stock Reservoir	STO	019N	094W	5	NW1/4SW1/4	2.66	FREWEN DRAW	41.64986	-108.02224
CR08/478	10/16/1975	--	UNION PACIFIC LAND RESOURCES CORP	Frewen Stock Reservoir	STO	019N	094W	5	NW1/4SW1/4	2.66	FREWEN DRAW	41.64991	-108.02355
P8523S	09/25/1978	Fully Adjudicated	Steve F. Adams	Adams #1D Stock Reservoir	STO	019N	094W	9	NE1/4SW1/4	2.66	Cecil Draw	41.63560	-107.99967
CR10/215	09/25/1978	--	STEVE F. ADAMS	Adams #1D Stock Reservoir	STO	019N	094W	9	NE1/4SW1/4	2.66	Cecil Draw	41.63560	-107.99967

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P8522S	09/25/1978	Fully Adjudicated	Steve F. Adams	Adams #1C Stock Reservoir	STO	019N	094W	11	NW1/4SE1/4	2.66	Esther Draw	41.63597	-107.95643
CR10/213	09/25/1978	--	STEVE F. ADAMS	Adams #1C Stock Reservoir	STO	019N	094W	11	NW1/4SE1/4	2.66	Esther Draw	41.63597	-107.95643
P10527R	05/05/1997	Unadjudicated	--	Wamsutter Saltwater Disposal No. 2 Reservoir	IND; TEM; COMBBU	019N	094W	13	NW1/4NW1/4	420	Dry Lake Bed	41.62880	-107.94683
P8524S	09/25/1978	Fully Adjudicated	Steve F. Adams	Adams #1E Stock Reservoir	STO	019N	094W	19	NW1/4NE1/4	2.66	Jody Draw	41.61383	-108.03317
CR10/216	09/25/1978	--	STEVE F. ADAMS	Adams #1E Stock Reservoir	STO	019N	094W	19	NW1/4NE1/4	2.66	Jody Draw	41.61383	-108.03317
P11370S	09/09/1991	Fully Adjudicated	--	South Wamsutter Stock Reservoir	STO	019N	094W	22	NE1/4SW1/4	2.49	South Wamsutter Rim Draw	41.60680	-107.98045
CR13/191	09/09/1991	--	USDI BLM	South Wamsutter Stock Reservoir	STO	019N	094W	22	NE1/4SW1/4	2.49	South Wamsutter Rim Draw	41.60680	-107.98045
P11368S	09/09/1991	Fully Adjudicated	--	Dry Lake Stock Reservoir	STO	019N	094W	26	SE1/4SE1/4	1.79	Spring Pit Draw	41.58872	-107.95161
CR13/190	09/09/1991	--	USDI BLM	Dry Lake Stock Reservoir	STO	019N	094W	26	SE1/4SE1/4	1.79	Spring Pit Draw	41.58881	-107.95158
P9111D	06/07/1909	--	Rasmusson Sheep Co.	Rasmussen Ditch No. 1	IRR; STO	019N	095W	4	SW1/4SW1/4	1.31	Un-named Creek	41.64619	-108.11972
UW03/473	07/10/1972	Fully Adjudicated	MOYER'S SERVICE	MOYER NO. 1 WELL	MIS	019N	095W	4	SW1/4NW1/4	10.00		41.65341	-108.11977
P15320D	12/29/1918	Unadjudicated	Rasmusson Sheep Co.	Supply Ditch	IRR; STO	019N	095W	5	SE1/4SE1/4		Red Wash Draw	41.64573	-108.12238
P9112D	06/07/1909	--	Rasmusson Sheep Co.	Rasmussen Ditch No. 2	IRR; STO	019N	095W	5	SW1/4NE1/4	6.71	Un-named Creek	41.65335	-108.12939
P9113D	06/07/1909	--	Rasmusson Sheep Co.	Rasmussen Ditch No. 3	IRR; STO	019N	095W	5	SW1/4NE1/4	12.99	NAMING ERRORS	41.65335	-108.12939
P8044S	10/16/1975	Fully Adjudicated	Steve F. Adams	Wamsutter Rim Stock Reservoir	STO	019N	095W	11	NW1/4SE1/4	2.66	WAMSUTTER RIM L	41.63550	-108.07181
CR08/434	10/16/1975	--	STEVE F. ADAMS	Wamsutter Rim Stock Reservoir	STO	019N	095W	11	NW1/4SE1/4	2.66	WAMSUTTER RIM L	41.63550	-108.07181
P8043S	10/16/1975	Fully Adjudicated	Steve F. Adams	Red Lake Stock Reservoir	STO	019N	095W	15	NE1/4SE1/4	2.66	Red Draw	41.62102	-108.08585
CR08/433	10/16/1975	--	STEVE F. ADAMS	Red Lake Stock Reservoir	STO	019N	095W	15	NE1/4SE1/4	2.66	Red Draw	41.62102	-108.08585
P7763S	06/26/1974	Fully Adjudicated	USDI BLM	East Red Draw (Index #4345) Stock Reservoir	STO	019N	095W	18	NE1/4NW1/4	3.22	MIDDLE RED DRAW	41.62796	-108.15330
P9795S	10/28/1985	Fully Adjudicated	--	Lower Red Draw Stock Reservoir	STO	019N	095W	18	NW1/4NE1/4	5.87	Middle Red Draw	41.62798	-108.14850
CR11/457	10/28/1985	--	USDI BLM	Lower Red Draw Stock Reservoir	STO	019N	095W	18	NW1/4NE1/4	5.87	Middle Red Draw	41.62798	-108.14850
CR08/077	06/26/1974	--	USDI BLM	East Red Draw (Index #4345) Stock Reservoir	STO	019N	095W	18	NE1/4NW1/4	3.22	MIDDLE RED DRAW	41.62796	-108.15330
P10878S	01/24/1990	--	--	Powerline Pit Stock Reservoir	STO	019N	095W	20	NW1/4NE1/4	1.38	Powerline Wash	41.61366	-108.12923
P7753S	06/26/1974	Fully Adjudicated	USDI BLM	Northeast Point (Index #4343) Stock Reservoir	STO	019N	095W	20	NW1/4SW1/4	4.26	West Fork Northeast Wash	41.60639	-108.13886
CR08/316	06/26/1974	--	USDI BLM	Northeast Point (Index #4343) Stock Reservoir	STO	019N	095W	20	NW1/4SW1/4	4.26	West Fork Northeast Wash	41.60638	-108.13886

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P9794S	10/28/1985	--	--	Jolley Stock Reservoir	STO	019N	095W	28	SE1/4SE1/4	1.54	Wells Bluff Draw	41.58998	-108.10593
P7754S	06/26/1974	Fully Adjudicated	USDI BLM	Tortilla (Index #4344) Stock Reservoir	STO	019N	095W	30	NW1/4NW1/4	2.03	Tortilla Draw	41.59905	-108.15845
CR08/078	06/26/1974	--	USDI BLM	Tortilla (Index #4344) Stock Reservoir	STO	019N	095W	30	NW1/4NW1/4	2.03	Tortilla Draw	41.59905	-108.15845
P7742S	06/26/1974	Fully Adjudicated	USDI BLM	Red Flat (Index #4341) Stock Reservoir	STO	019N	095W	36	NW1/4SW1/4	2.98	Confusion Draw	41.57764	-108.06190
CR08/081	06/26/1974	--	USDI BLM	Red Flat (Index #4341) Stock Reservoir	STO	019N	095W	36	NW1/4SW1/4	2.98	Confusion Draw	41.57763	-108.06190
UW04/458	11/10/1977	--	PANHANDLE EASTERN PIPE LINE COMPANY	Tipton Compressor No. 1 Well	MIS	019N	096W	7	NW1/4NE1/4	5.00	--	41.64244	-108.26468
UW04/459	04/09/1984	--	PANHANDLE EASTERN PIPE LINE COMPANY	Tipton Compressor No. 1 Well,, Enl.	MIS	019N	096W	7	NW1/4NE1/4	0.00	--	41.64244	-108.26468
P7765S	06/26/1974	Fully Adjudicated	USDI BLM	West Red Draw (Index #4347) Stock Reservoir	STO	019N	096W	22	SE1/4SE1/4	3.62	West Red Draw	41.60272	-108.20197
CR08/079	06/26/1974	--	USDI BLM	West Red Draw (Index #4347) Stock Reservoir	STO	019N	096W	22	SE1/4SE1/4	3.62	West Red Draw	41.60272	-108.20197
P7764S	06/26/1974	Fully Adjudicated	USDI BLM	Middle Red Draw (Index #4346) Stock Reservoir	STO	019N	096W	24	SW1/4NE1/4	3.62	MIDDLE RED DRAW	41.60987	-108.16844
P9763S	09/12/1985	--	--	Lower Middle Red Draw Stock Reservoir	STO	019N	096W	24	SW1/4NE1/4	5.96	Middle Red Draw	41.60987	-108.16844
CR08/317	06/26/1974	--	USDI BLM	Middle Red Draw (Index #4346) Stock Reservoir	STO	019N	096W	24	SW1/4NE1/4	3.62	MIDDLE RED DRAW	41.60987	-108.16844
P11369S	09/09/1991	--	--	Tiny Draw Stock Reservoir	STO	019N	097W	26	NE1/4NE1/4	1.60	Tiny Draw	41.59997	-108.29443
P7778S	06/26/1974	Fully Adjudicated	USDI BLM	Upper Red Draw (Index #4351) Stock Reservoir	STO	019N	097W	36	SW1/4NE1/4	3.62	Red Wash Draw	41.58043	-108.28201
CR08/076	06/26/1974	--	USDI BLM	Upper Red Draw (Index #4351) Stock Reservoir	STO	019N	097W	36	SW1/4NE1/4	3.62	Red Wash Draw	41.58185	-108.27950
UW05/142	04/01/1983	--	COLORADO INTERSTATE GAS COMPANY	Table Rock No. 1 Well,, Enl.	MIS	019N	098W	23	SW1/4NE1/4	0.00	--	41.61104	-108.41504
UW05/143	04/01/1983	--	COLORADO INTERSTATE GAS COMPANY	Table Rock No. 2 Well,, Enl.	MIS	019N	098W	23	NW1/4SE1/4	0.00	--	41.60742	-108.41504
UW05/144	04/01/1983	--	COLORADO INTERSTATE GAS COMPANY	Table Rock No. 3 Well,, Enl.	MIS	019N	098W	23	NE1/4SW1/4	0.00	--	41.60742	-108.41986
UW05/145	04/01/1983	--	COLORADO INTERSTATE GAS COMPANY	Table Rock No. 4 Well,, Enl.	MIS	019N	098W	23	SW1/4NE1/4	0.00	--	41.61104	-108.41504
UW05/146	04/01/1983	--	COLORADO INTERSTATE GAS COMPANY	Table Rock No. 5 Well,, Enl.	MIS	019N	098W	23	SW1/4NE1/4	0.00	--	41.61104	-108.41504

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P5143R	09/28/1939	Unadjudicated	USDI, DIVISION OF GRAZING	Willow Draw Reservoir	STO	020N	091W	6	SE1/4SE1/4	12.48	Willow Draw	41.73203	-107.68520
P5172R	09/28/1939	Unadjudicated	USDI - Grazing Service	Latham Reservoir	STO	020N	092W	14	SE1/4SE1/4	5.51	Latham Draw	41.70356	-107.72257
UW03/433	06/30/1977	--	UNION PACIFIC RAILROAD COMPANY	CRESTON #1	MIS	020N	092W	15	SW1/4SW1/4	10.00	--	41.70365	-107.75622
UW03/434	08/30/1977	--	UNION PACIFIC RAILROAD COMPANY	ENL CRESTON #1	MIS	020N	092W	15	SW1/4SW1/4	10.00	--	41.70365	-107.75622
P10712S	05/17/1989	--	--	Backbone Stock Reservoir	STO	020N	092W	20	NE1/4NE1/4	1.70	LATHAM DRAW	41.70110	-107.77868
P10286S	10/05/1987	--	--	44 Ranch Stock Reservoir	STO	020N	092W	22	NE1/4NE1/4	3.68	Ollie's Draw	41.70000	-107.74170
P10282S	10/05/1987	--	--	44 Ranch Pit No. 2 NP Stock Reservoir	STO	020N	092W	30	SE1/4SW1/4	4.68	Kerry's Cove	41.67474	-107.80888
P8707S	08/20/1980	Fully Adjudicated	P. H. LIVESTOCK CO.	Hansen Stock Reservoir	STO	020N	093W	29	SE1/4SE1/4	1.00	Hansen Draw	41.67625	-107.89336
CR09/495	08/20/1980	--	P. H. LIVESTOCK CO.	Hansen Stock Reservoir	STO	020N	093W	29	SE1/4SE1/4	1.00	Hansen Draw	41.67534	-107.89385
P9203R	04/03/1979	Fully Adjudicated	Town of Wamsutter	Wamsutter Wastewater Treatment Reservoir	IND	020N	094W	26	SE1/4SW1/4	73.45	Latham Draw	--	--
CR11/052	04/03/1979	--	TOWN OF WAMSUTTER	Wamsutter Wastewater Treatment Reservoir	IND	020N	094W	26	SW1/4SW1/4	0.00	Latham Draw	41.67563	-107.96602
UW06/247	02/06/1978	--	DOUG AND DARLENE DOWLIN	J W S 101 Well	MIS	020N	094W	34	NE1/4SE1/4	100.00	--	41.66479	-107.97085
UW09/293	11/30/1981	--	THE ESTATE OF DORIS M. BATH	Norton No. 1 Well	MIS	020N	094W	34	SW1/4SE1/4	150.0	--	41.66117	-107.97565
P3510R	11/29/1918	--	Rasmusson Sheep Co.	Basine Reservoir	IRR; STO; COMBBU	020N	095W	16	NE1/4SW1/4	1,216.85	RED WASH DRAW	41.70777	-108.11503
P2265E	05/16/1910	--	Rasmusson Sheep Co.	Rasmussen Ditch #1 (Enl. of)	IRR	020N	095W	33	SW1/4SW1/4	--	NAMING ERRORS	--	--
P10283S	10/05/1987	--	--	Tipton Road Well Pit.	STO	020N	096W	6	NW1/4NW1/4	2.33	SCARLET SAHARA DRAW	41.73985	-108.26118
P10601S	01/04/1989	--	--	G. L. No. 1 Stock Reservoir	STO	020N	097W	2		1.20	TWIN PEON DRAW	41.74076	-108.30882
P10676S	03/31/1989	--	--	North Creston No. 4 Stock Reservoir	STO	021N	091W	28	SW1/4SW1/4	14.00	South Creston Draw	41.75652	-107.69679
P15043D	03/26/1918	--	SAVAGE LIVESTOCK CO.	Savage Supply Ditch	RES; STO	021N	091W	28	NE1/4SE1/4	0.00	South Creston Draw	41.76138	-107.68269
P3472R	03/26/1918	--	SAVAGE LIVESTOCK CO.	Savage Reservoir	STO	021N	091W	28	SE1/4NE1/4	14.05	South Creston Draw	41.76461	-107.68034
P10876S	01/24/1990	Unadjudicated	--	Latham Stock Reservoir	STO	021N	092W	2	NW1/4NW1/4	1.19	Separation Lake	41.82227	-107.75916
P10530S	12/19/1988	--	--	Field Check Stock Reservoir	STO	021N	092W	21	NW1/4NE1/4	0.50	Farmer Draw	41.78234	-107.80293
P10505S	09/30/1988	Fully Adjudicated	P H Livestock Co.	Niels Stock Reservoir	STO	021N	092W	25	NW1/4NW1/4	4.36	Barren Draw	41.76791	-107.75459
CR12/355	09/30/1988	--	JOHN EDWARD PREECE (SELLER)	Niels Stock Reservoir	STO	021N	092W	25	NW1/4NW1/4	4.36	Barren Draw	41.76791	-107.75459
P10506S	09/30/1988	Unadjudicated	P H Livestock Co.	Creston Stock Reservoir	STO	021N	092W	27	SE1/4NW1/4	5.67	Creston Draw	41.76477	-107.79032

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
CR12/356	09/30/1988	--	JOHN EDWARD PREECE (SELLER)	Creston Stock Reservoir	STO	021N	092W	27	SE1/4NW1/4	5.67	Creston Draw	41.76435	-107.78846
P19495D	12/21/1940	Unadjudicated	K.H. HADSELL	Diversion Ditch	RES	021N	093W	27	NE1/4SE1/4	0.00	Five Mile Draw	41.75965	-107.89386
P5386R	12/21/1940	Unadjudicated	K.H. HADSELL	Hadsell Reservoir	IRR; STO; COMBBU	021N	093W	33	NE1/4NE1/4	363.17	Hadsell Draw	41.75282	-107.91367
P10879S	01/24/1990	--	--	Five Mile Stock Reservoir	STO	021N	095W	35	NW1/4SW1/4	1.07	Five Mile Draw	41.74544	-108.12276
P13667R	05/24/2010	Complete	ROBERT HARDEK	HARDEK	STO; WL	022N	091W	9	SE1/4SE1/4	--	Cameno Draw	41.887431	-107.68193
P5751S	12/12/1966	Fully Adjudicated	LOUIS LARSEN SHEEP CO.	Pronghorn Stock Reservoir	STO	022N	093W	5	NE1/4NW1/4	1.93	East Fork Sourdough Gulch	41.912729	-107.94351
CR04/150	12/12/1966	--	LOUIS LARSEN SHEEP CO.	Pronghorn Stock Reservoir	STO	022N	093W	5	NE1/4NW1/4	1.93	East Fork Sourdough Gulch	41.91273	-107.94351
P5071S	03/29/1965	Unadjudicated	PIONEER LIVESTOCK CO.	Monument Lake Stock Reservoir	STO	022N	093W	31	SE1/4NW1/4	0.95	MONUMENT L DRAW	41.837163	-107.96113
P10528R	05/05/1997	Unadjudicated	--	Wamsutter Saltwater Disposal No. 3 Reservoir	IND; TEM; COMBBU	022N	094W	35	SW1/4NW1/4	7.50	Monument Lake	41.836891	-108.00610
P13446R	05/07/2009	Incomplete	--	ENLARGED WAMSUTTER EVAPORATION POND 2, CELLS 3 AND 4 RESERVOIR	IND	022N	094W	35	SW1/4NW1/4	--	Monument Lake	41.836111	-108.00450
P7739S	06/24/1974	Unadjudicated	Curtis Rochelle	Stranburg Stock Reservoir	STO	022N	095W	33	SW1/4NE1/4	1.54	STRANBURG DRAW	41.837382	-108.15105
P9423R	08/31/1984	Incomplete	KENNECOTT URANIUM CO	REB FINAL IMPOUNDMENT RESERVOIR	WL	023N	094W	3	SW1/4NE1/4	3,128.0	Battle Spring Draw	41.997847	-108.017633
P5174R	09/28/1939	Unadjudicated	USDI - Grazing Service	Sour Dough Reservoir	STO	023N	094W	26	SW1/4SW1/4	24.99	SOUR DOUGH DRAW	41.931665	-108.006138
P25157D	08/11/1976	Unadjudicated	--	Siberia Ridge Unit Well #5 (Water Haul)	DRI; IND; OIL; TEM	023N	096W	25	NW1/4NW1/4	0.39	Lost Creek Draw	41.942215	-108.218117
P547R	07/20/1904	Fully Adjudicated	SWEETWATER CATTLE CO.	Hay Reservoir	IRR; STO; COMBBU	023N	097W	2	NW1/4SW1/4	2,480.0	Red Creek	41.994879	-108.353991
P6146D	07/20/1904	Fully Adjudicated	SWEETWATER CATTLE CO.	Hay Ditch	IRR; STO	023N	097W	2	NW1/4SW1/4	4.63	Red Creek	41.995344	-108.354645
CC26/440	07/20/1904	--	JOHN W. HAY	Hay Reservoir	DOM; IRR; STO	023N	097W	2	NW1/4SW1/4	2,480.0	Red Creek	41.99322	-108.35625
CC26/441	07/20/1904	--	JOHN W. HAY	Hay Ditch	DOM; IRR; STO	023N	097W	2	NW1/4SW1/4	0.00	Red Creek	41.99322	-108.35625
CC46/411	07/20/1904	--	SWEETWATER CATTLE CO.	Hay Ditch	DOM; IRR; STO	023N	097W	2	NW1/4SW1/4	--	Red Creek	41.99322	-108.35625
CR01/012	07/20/1904	--	SWEETWATER CATTLE CO.	Hay Reservoir	DOM; IRR; STO	023N	097W	2	NW1/4SW1/4	--	Red Creek	41.99322	-108.35625
P12791S	03/22/1996	--	--	Sand Dune (6474) Stock Reservoir	STO	023N	097W	13	SE1/4NE1/4	0.35	Red Desert Basin	41.968785	-108.325125

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-4. Surface water rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Facility Name	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Source Name	Lat	Long
P3983R	03/07/1925	--	John Bugas	Eagle Nest Reservoir	DOM; IRR; STO; COMBBU	024N	095W	3	NE1/4NE1/4	1,364.92	Lost Creek	42.086859	-108.12597
P222S	06/13/1946	Complete	BESSIE MCINTOSH	EAGLE DRAW STOCK RESERVOIR	STO	024N	095W	12	SE1/4SE1/4	1.24	Eagle Draw	42.062353	-108.08873
CC38/117	07/09/1912	--	JOHN W. HAY	Bush Creek Ditch	RES	024N	096W	7	NW1/4NW1/4	0.00	--	--	--
CC38/119	08/11/1911	--	JOHN W. HAY	Bush Lake Reservoir	IRR; STO	024N	096W	7	NW1/4NW1/4	1,685.9	Bush Creek	--	--
CC38/114	10/17/1906	--	JOHN W. HAY	Bush Lake Cut Ditch	IRR; STO	024N	096W	18	SE1/4NW1/4	0.00	Bush Creek	42.0542	-108.31049
CC46/410	10/17/1906	--	SWEETWATER CATTLE CO.	Bush Lake Cut Ditch	DOM; IRR; STO	024N	096W	18	SE1/4NW1/4	--	Bush Creek	42.0542	-108.31049
P12784S	03/22/1996	--	--	Lost Creek Rim (6475) Stock Reservoir	STO	024N	096W	24	SW1/4SW1/4	0.48	NORTH LONELY DRAW	42.03262	-108.21785
P11131S	09/06/1990	--	--	Karo Stock Reservoir	STO	024N	096W	35	SE1/4SE1/4	0.70	LOST DRAW	42.003724	-108.22280
P12790S	03/22/1996	--	--	Bush Lake Water (6257) Stock Reservoir	STO	024N	097W	12	NE1/4NE1/4	0.53	DRAINAGE OF BUSH LAKE	42.06917	-108.32490
P11341D	07/09/1912	Fully Adjudicated	SWEETWATER CATTLE COMPANY	Bush Creek Ditch	IRR; RES	024N	097W	12	NW1/4NW1/4	0.00	--	42.073792	-108.33803
P6453D	01/19/1905	Fully Adjudicated	John W. Hay	Hay Supply Ditch	IRR; RES; STO	024N	097W	14	NW1/4NE1/4	0.00	Bush Creek	42.059323	-108.34774
CC38/113	01/19/1905	--	JOHN W. HAY	Hay Supply Ditch	RES	024N	097W	14	NW1/4NE1/4	0.00	Bush Creek	42.05932	-108.34774
P12796S	03/22/1996	--	--	Presidio (6256) Stock Reservoir	STO	024N	097W	26	NE1/4SW1/4	0.42	Luman Butte Draw	42.02312	-108.35261
P11339D	08/28/1911	Fully Adjudicated	SWEETWATER CATTLE COMPANY	Hay Ditch No. 1	IRR; STO	024N	097W	35	NE1/4SE1/4	34.43	Red Creek	42.006979	-108.34245
P11340D	07/09/1912	--	SWEETWATER CATTLE COMPANY	Hay Ditch No. 2	IRR; STO	024N	097W	35	NE1/4SE1/4	8.76	Red Creek	42.006979	-108.34245
CC38/115	07/09/1912	--	JOHN W. HAY	Hay Ditch No. 2	IRR; STO	024N	097W	35	NE1/4SE1/4	8.70	Red Creek	42.00693	-108.34245
CC38/116	08/28/1911	--	JOHN W. HAY	Hay Ditch No. 1	IRR; STO	024N	097W	35	NE1/4SE1/4	32.12	Red Creek	42.00693	-108.34245
P2339R	08/11/1911	Fully Adjudicated	SWEETWATER CATTLE CO.	Hay Reservoir, Enlarged	IRR; STO; COMBBU	024N	097W	35	SE1/4NE1/4	5,846.59	Red Creek	42.011772	-108.34391
CC38/118	08/11/1911	--	JOHN W. HAY	Hay Reservoir, Enl.	IRR; STO	024N	097W	35	SE1/4NE1/4	5,846.59	Red Creek	42.01237	-108.34291

**Notes for non-mining-related surface water rights within 1 mile of the CD-C project area:**

**Search Conducted February 15, 2011**

Water rights were searched to the nearest quarter-quarter of each section listed above. Any part of a quarter-quarter section that lies within one mile of the CD-C project area is included. A double dash (--) indicates no information is available.

**Record suffixes are denoted as follows:**

"A" Adjudicated (finalized) rights; unless the right is a territorial appropriation, there will be a match in the reference column from one of the following permit types for the unadjudicated portion

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

"D" Ditch or pipeline permit  
"E" Enlargement of a ditch or pipeline permit  
"R" Reservoir permit  
"S" Stock reservoir permit

### Use Codes

COMBBU	Combined Beneficial Use	IND		RES	Reservoir supply
OM	Domestic	IRR		STO	Stock
FIS	Fish Propagation	MIS	Miscellaneous	TEM	Temporary
FLO	Flood Control	OIL	Oil Refining/Production	WET	Wetlands
FTH	Flow-through Non-consumptive	REO	Industrial Recreation	WL	Wildlife
			Irrigation		

Separate water rights with a status code of ABA, A&C, AME, CAN, ELI, EXP, REJ, or TRA were eliminated from the search area listing provided above (including those belonging to the mining companies), as none of these use codes represent a valid current right.



## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-5. WDEQ use classifications<sup>1</sup>**

Class of Water	Outstanding Values	Drinking Water	Game Fish	Non-Game Fish	Fish Consumption	Other Aquatic Life	Recreation	Wildlife	Agriculture	Industry	Scenic Value
2AB	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2C	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3A	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3B	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
4B	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
4C	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes

<sup>1</sup> Only those classifications used in the CD-C project area are included in this list.

<sup>2</sup> "Yes" means that it is protected for the use specified, and "No" means that it is not.

Source: WDEQ 2001

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-6. WDEQ use-classified water bodies near and in the CD-C project area**

Reservoirs, Lakes, and Ponds (Use Classification)	Source Water	Acres	Surface Ownership
Alkali Lake (3A)	Spring Fed	24	BLM/WGFD
Bush Lake (3B)	Bear Creek	334	BLM
Chain Lakes (3A)	Spring Fed	1,000	BLM/WGFD
Circle Bar Lake (3A)	Spring Fed	240	WGFD
Eightmile Lake (3A)	Spring Fed	75	BLM/PRIVATE
Hansen Lake (3B)	Spring Fed	52	WGFD
Hay Reservoir (3B)	Red Creek	1,000	BLM/STATE
Lost Creek Lake (3B)	Lost Creek	824	BLM/STATE
Mud Lake (3A)	Spring Fed	98	BLM
Robber's Gulch Reservoir (2AB)	Robber's Gulch	50	BLM
Streams and Springs			Classification
<b>Upper Green/White-Yampa</b>			
Little Snake River <sup>1</sup>			2AB
Muddy Creek (mouth to Section 29, T17N, R89W) <sup>1,2</sup>			2C
Barrel Springs Draw <sup>2</sup>			3B
Windmill Draw <sup>2</sup>			3B
North Barrel Springs Draw <sup>2</sup>			3B
North Prong Red Wash <sup>2</sup>			3B
Robber's Gulch <sup>1,2</sup>			3B
Bitter Creek <sup>1,2</sup>			2C
<b>Great Divide Basin</b>			
Dugout Draw <sup>1,2</sup>			3B
Fivemile Ditch <sup>2</sup>			3B
Echo Springs <sup>2</sup>			3B
Separation Creek <sup>1</sup>			4C
Fillmore Creek <sup>2</sup>			3B
Creston Draw <sup>1,2</sup>			3B
Buck Draw <sup>1,2</sup>			3B
Mud Springs <sup>2</sup>			3B
Lost Creek <sup>1,2</sup>			3B
Red Creek <sup>1,2</sup>			4B
Bear Creek <sup>1,2</sup>			3B

<sup>1</sup> Located near CD-C project area.

<sup>2</sup> Located within CD-C project area.

Sources for reservoirs, lakes, and ponds: WDEQ 2001, and WGFD 2007b

Sources for streams and springs: WDEQ 2010

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-7. Surface water quality at selected sites within and adjacent to the CD-C project area**

Station Number	SURFACE WATER QUALITY STATION									
	USGS									WDEQ
	Little Snake River		Muddy Creek			Lower Barrel Springs Draw	Bitter Creek	Upper Filmore Creek	Separatio n Creek	Chain Lakes, Hansen Lake
	09257000	09259050	09258900	09259000	09258980	09216310	09216545	09219240	09216527	481
Monitirong site located in CD-C project area?	No	No	No	No	No	Yes	No	Yes	No	Yes
Sample period	1957–1988	1980–1997	1976–1978	1957–1991	April 2006–present <sup>1</sup>	1978–1979	1975–1981	4/18/1979	1975 – 1981	1974–1980
Number of samples <sup>2</sup>	107	100	3	41	64	7	155	1	45	15
pH	8.1	8.1	8.6	8.2	8.3	8.4	8.4	7.7	8.2	9.1
Conductance, µmhos/cm (mean)	259 <sub>(34)</sub>	366 <sub>(90)</sub>	1,350 <sub>(2)</sub>	966 <sub>(35)</sub>	1,812 <sub>(64)</sub>	533 <sub>(4)</sub>	1,755 <sub>(149)</sub>	700 <sub>(1)</sub>	1,089 <sub>(39)</sub>	4,502 <sub>(7)</sub>
Conductance, µmhos/cm (min)	82	87	600	529	448	340	280	700	220	1,800
Conductance, µmhos/cm (max)	460	855	2,100	1,790	3,990	1,000	4,500	700	2,390	11,350
TDS (mean)	158 <sub>(9)</sub>	243 <sub>(17)</sub>	913 <sub>(2)</sub>	346 <sub>(1)</sub>	1,249 <sub>(55)</sub>	619 <sub>(1)</sub>	1,289 <sub>(78)</sub>	495 <sub>(1)</sub>	200 <sub>(1)</sub>	4,465 <sub>(8)</sub>
TDS(min)	46	87	396	346	267	619	295	495	200	1,304
TDS (max)	260	540	1,430	346	2,810	619	2,740	495	200	11,289
Suspended solids <sup>3</sup> (mean)	154 <sub>(101)</sub>	228 <sub>(25)</sub>	6,198 <sub>(2)</sub>	3,191 <sub>(41)</sub>	300 <sub>(55)</sub>	nm	1,843 <sub>(105)</sub>	141 <sub>(1)</sub>	490 <sub>(1)</sub>	423
Suspended solids <sup>3</sup> (min)	4	6	195	7	13	nm	22	141	490	15
Suspended solids <sup>3</sup> (max)	1,180	852	12,200	22,500	2,530	nm	21,900	141	490	956
Turbidity, NTU	13	167	1,260	nm	55	17	305	98 <sup>4</sup>	131	nm
Calcium	30	34	54	42	79	28	40	32	74	13
Magnesium	8	12	44	40	50	2	27	68	69	8
Potassium	2	2	7	9	4	5	3	7	6	13
Sodium	11	26	200	286	274	205	348	22	80	1,604
Bicarbonate	159	190	373	308	nm	500	369	68	277	1,400
Sulfate	25	54	380	320	515	100	590	320	385	1,139
Chloride	3	2	65	32	126	12	39	12	13	342
Iron, µmhos/cm g/L	74	164	105	nm	30	nm	103	210	76	17,090
Hardness (CaCO3)	111	151	315	270	404	80	211	nm	467	67
Dissolved oxygen	9	10	11	10	10	5.2	9.7	5	8.2	6.4

<sup>1</sup> Daily mean values analyzed April 18, 2006 to February 2, 2011.

<sup>2</sup> Total number of grab samples analyzed; not every parameter was analyzed in every sample.

<sup>3</sup> Total concentration; except as noted here, all reported values represent dissolved concentrations.

JTU - Jackson turbidity units.

nm - Not measured.

<sub>(34)</sub> - Number of samples analyzed for this parameter.

All units are mg/L except as noted.

Source: WRDS 2007, USGS 2011

## APPENDIX F—SUPPORTING WATER RESOURCES DATA

**Table F-8. Muddy Creek water quality<sup>1</sup>**

Parameter	Unit	Count	Mean <sup>2</sup>	Maximum	Minimum
Specific Conductance	µmhos	98	1,416.9	3,990.0	0.3
Total dissolved solids	mg/L	59	1,236.0	2,810.0	267
Total suspended solids	mg/L	59	2,595.2	22,500.0	7.0
Turbidity	NTU	22	240.8	2,500.0	10.0
pH	standard units	88	8.4	9.5	7.6
Dissolved oxygen	mg/L	78	9.7	17.6	6.1
Hardness as CaCO <sub>3</sub>	mg/L	75	371.7	744.0	54.6
Alkalinity as CaCO <sub>3</sub>	mg/L	55	311.0	478.0	117.0
Calcium	mg/L	20	68.8	130.0	22.0
Magnesium	mg/L	74	43.8	97.1	3.9
Sodium	mg/L	75	222.0	693.0	3.6
Potassium	mg/L	76	4.5	9.8	1.3
Sodium adsorption ratio	none	60	5.6	11.4	0.1
Sulfate	mg/L	75	437.8	1,210.0	21.0
Chloride	mg/L	75	95.7	417.0	0.7
Bicarbonate	mg/L	20	227.1	565.0	121.0
Carbonate	mg/L	14	11.2	114.0	0.0
Fluoride	mg/L	65	0.9	11.0	0.2
Silica	mg/L	60	12.6	39.0	3.7
Coliforms, fecal	count/100 mL	8	131.3	420.0	20.0
Aluminum, dissolved	µg/L	1	< 100.0	< 100.0	< 100.0
Arsenic, dissolved	µg/L	57	2.0	3.2	0.8
Barium, dissolved	µg/L	2	76.5	< 100.0	53.0
Beryllium, dissolved	µg/L	1	< 0.01	< 0.01	< 0.01
Boron, dissolved	µg/L	3	153.3	360.0	20.0
Cadmium, dissolved	µg/L	2	0.02	0.04	0.0
Chromium, dissolved	µg/L	1	0.5	< 1.0	< 1.0
Copper, dissolved	µg/L	2	2.1	2.2	< 2.0
Iron, dissolved	µg/L	10	253.6	876.0	20.0
Lead, dissolved	µg/L	1	0.1	0.1	0.1
Manganese, dissolved	µg/L	5	65.8	218.0	< 10
Mercury, dissolved	µg/L	1	< 0.5	< 0.5	< 0.5
Molybdenum, dissolved	µg/L	1	8.0	8.0	8.0
Selenium, dissolved	µg/L	3	4.3	8.0	2.0
Silver, dissolved	µg/L	2	0.0	0.0	0.0
Uranium, dissolved	µg/L	3	10.1	16.0	6.9
Zinc, dissolved	µg/L	2	12.9	< 20	5.7
Radium 226	pCi/L	2	0.5	1.2	0.17
Gross alpha	pCi/L	2	22.5	23.0	22.0
Gross beta	pCi/L	2	6.8	7.0	< 6.5

<sup>1</sup> Based on Sampling Sites 9217220, 09258900, 09258980, 09259000, MCR3, MCDAD, 412325107244101, 412614107452101

<sup>2</sup> Geometric mean

µmhos = micromhos

mg/L = milligrams per liter

µg/L = micrograms per liter

pCi/L = picocuries per liter

Source: WRDS 2007

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-9. 2010 303(d) water bodies in the CD-C project area with impairments or threats**

Surface Water	Impairments or Threats	Location	Impairments/ Threats	Use Impaired/ Threatened	Date	Priority
<b>Little Snake River Basin (HUC 14050003 and HUC 14050004)</b>						
Muddy Creek	Threats	West of State Hwy 789	Habitat degradation	Non-game fish; aquatic life	1996	Moderate
Muddy Creek	Threats	Above Alamosa Gulch to Littlefield Creek	Habitat degradation	Cold fish, aquatic life	1996	Moderate
Muddy Creek	Threats	Below Youngs Draw upstream to Deep Creek	Chloride, Selenium	Aquatic Life	2010	Not Identified In Report

Source: WDEQ 2010

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-10. Water-bearing characteristics of geologic formations in the Washakie and Great Divide structural basins**

Era	Period	Geologic Unit	Thickness	HYDROLOGIC PROPERTIES		
				Well Yield (gpm)	Transmissivity (gpd/ft)	Permeability (gpd/ft <sup>2</sup> )
Cenozoic	Quaternary		0–70	<30	168-560	21-62
	Tertiary	Washakie Formation (Uinta & Bridger Formations)	0–3,200			
		Laney Member of Green River Fm.	0–1,500	<200	100 - 300	10
		Wasatch Fm.	0–4,000+	30–50	150–10,000	0.04–18.2
		Battle Springs Fm.	0–4,700	1–157	29–3,157	NM
		Fort Union Fm.	0–2,700+	3-300	<2,500	<1
Mesozoic	Upper Cretaceous	Lance Fm.	0–4,500+	<25	<20	0.007–8.2
		Fox Hills Sandstone	0–400	NM	10-20	0.9
		Lewis Shale	0–2,700+	2–252	0.03–50	0.002–0.9
		Mesaverde Group (excl. Almond Fm.)	0–2,800	<100	<3,000	NM
		Baxter Shale (incl. Steele Shale and Niobrara Fm.)	2,000–5,000+	Major regional aquitard between Mesaverde and Frontier aquifers. Hydrologic data unavailable.		
		Frontier Fm.	190–900+	1–100+	<100–6,500	NM
	Lower Cretaceous	Mowry Shale	150–525	Regional aquitard. Hydrologic data unavailable.		
		Thermopolis Shale (incl. Muddy sandstone)	40–235 (20–155)	Considered a leaking confining unit. Hydrologic data unavailable.		
		Cloverly Fm.	45–240	25–120	340–1,700	1–177
	Upper Jurassic	Morrison Fm.	170–450+	Confining unit between Cloverly and Sundance-Nugget aquifers. Hydrologic data unavailable.		
		Sundance Fm.	130–450+	27–35	12–3,500	NM
	Lower Jurassic-Upper Triassic	Nugget Sandstone	0–650+	35–200	<2,166	NM
	Triassic	Chugwater Fm.	900–1,500+	Confining unit between Sundance-Nugget and Paleozoic aquifers. Hydrologic data unavailable.		
Mesozoic-Paleozoic	Lower Triassic Permian	Phosphoria Fm.(incl. Goose Egg Fm.)	170–460	Probable poor water-bearing capabilities due to low permeability. Hydrologic data unavailable.		
Paleozoic	Permian-Pennsylvanian	Tensleep Fm.	0–840+	24–400	1–374	NM
	Middle and Lower Pennsylvanian	Amsden Fm.	2–260+	Probable poor water-bearing capabilities due to predominance of fine-grained sediments.		
	Mississippian	Madison Limestone	5–325+	<400	Variable	NM
Paleozoic	Cambrian	Indef. rocks	0–800+	4–250	NM	NM
Precambrian	N/A	Igneous and metamorphic rocks	Unknown	10–20	1<1,000	Generally high in upper 200 ft of unit

*Adapted from Table V-1 in Collentine et al. (1981). Formations not encountered in CD-C project area have been omitted.*

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-11. Existing groundwater rights within 1 mile of the CD-C project area, February 2011**

<b>SEO Use Designation (As Assigned)</b>	<b>Groundwater Rights</b>
Monitoring	366
Stock	249
Miscellaneous	198
Coalbed Methane (Coalbed methane natural gas)	153
Domestic	35
Domestic; Stock	34
Industrial	12
Miscellaneous; Monitoring	6
Municipal	6
Domestic; Miscellaneous	4
Miscellaneous; Stock	4
Domestic; Irrigation; Stock	3
Industrial; Miscellaneous	3
Domestic; Miscellaneous; Stock	2
Industrial; Stock	2
Blank	1
Domestic; Industrial; Irrigation; Miscellaneous	1
Domestic; Irrigation	1
Test well	1
<b>Total</b>	<b>1,081</b>
<b>Use Included in SEO Designation</b>	<b>Groundwater Rights</b>
Monitoring	372
Stock	294
Miscellaneous	218
Coalbed Methane (Coalbed methane natural gas)	153
Domestic	80
Industrial	18
Municipal	6
Irrigation	5
Test Well	1
<b>Total<sup>1</sup></b>	<b>1,147</b>

<sup>1</sup> Total (1,147) exceeds the number of permitted groundwater rights (1,081) since individual rights may have multiple uses

Source: SEO 2011

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area**

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P160584W	07/19/2004	--		MIS	014N	091W	18	NW1/4NW1/4	10	--	41.19001	-107.68558
P134628W	05/02/2001	Complete	Matthew L. or Sherry L. Weber	STK	014N	091W	19	NW1/4SE1/4	0	900.0	41.16826	-107.67606
P152301W	01/09/2003	Complete	Devon Energy Production Co., LP	MIS	014N	091W	19	NW1/4SE1/4	15	900.0	41.16826	-107.67606
P191830W	01/07/2003	Incomplete	MATT WEBER	MIS	014N	091W	19	NW1/4SE1/4	0	--	41.16779	-107.67608
P106883W	08/06/1997	Complete	LEE/DONNA JONS	STK	014N	091W	30	NW1/4NE1/4	5	280.0	41.16102	-107.67608
P6415P	11/09/1967	Complete	LEELAND U. GRIEVE	STK	014N	091W	32	SE1/4SE1/4	10	140.0	41.13564	-107.65218
P92382W	07/16/1993	--	--	MIS	014N	092W	10	SE1/4NE1/4	120	--	41.20088	-107.72875
P152940W	08/04/2003	Complete	Devon Energy Production Co., LP	MIS	014N	092W	12	NE1/4NE1/4	30	1,050.0	41.20450	-107.69034
P17372P	12/12/1961	Complete	--	STK	014N	092W	12	SW1/4NE1/4	5	110.0	41.20087	-107.69515
P178794W	12/11/2006	--	Devon Energy Production Co.	MIS	014N	092W	23	NE1/4SE1/4	40	--	41.16827	-107.70962
P69993W	05/10/1985	Complete	--	MON	015N	092W	3	NE1/4NW1/4	0	26.0	41.30587	-107.73830
P69994W	05/10/1985	Complete	--	MON	015N	092W	3	SE1/4NW1/4	0	22.0	41.30230	-107.73831
P69996W	05/10/1985	Complete	--	MON	015N	092W	3	SW1/4NW1/4	0	75.0	41.30230	-107.74312
P69997W	05/10/1985	Complete	--	MON	015N	092W	3	SW1/4NW1/4	0	17.0	41.30230	-107.74312
P69998W	05/10/1985	Complete	--	MON	015N	092W	3	SW1/4NW1/4	0	34.0	41.30230	-107.74312
P69999W	05/10/1985	Complete	--	MON	015N	092W	3	NW1/4SW1/4	0	19.0	41.29868	-107.74313
P70000W	05/10/1985	Complete	--	MON	015N	092W	3	NW1/4SW1/4	0	75.0	41.29868	-107.74313
P70002W	05/10/1985	Complete	--	MON	015N	092W	3	SW1/4NW1/4	0	40.0	41.30230	-107.74312
P70003W	05/10/1985	Complete	--	MON	015N	092W	4	NE1/4SE1/4	0	37.0	41.29869	-107.74794
P70005W	05/10/1985	Complete	--	MON	015N	092W	4	SE1/4SE1/4	0	32.0	41.29507	-107.74795
P70018W	05/10/1985	Complete	--	MON	015N	092W	4	SE1/4NE1/4	0	40.0	41.30231	-107.74792
P70019W	05/10/1985	Complete	--	MON	015N	092W	4	SE1/4NE1/4	0	39.0	41.30231	-107.74792
P70020W	05/10/1985	Complete	--	MON	015N	092W	4	SW1/4NE1/4	0	40.0	41.30232	-107.75272
P70022W	05/10/1985	Complete	--	MON	015N	092W	4	NW1/4NE1/4	0	43.0	41.30588	-107.75271
P70023W	05/10/1985	Complete	--	MON	015N	092W	4	NW1/4NE1/4	0	39.0	41.30588	-107.75271
P70024W	05/10/1985	Complete	--	MON	015N	092W	4	NW1/4NE1/4	0	34.0	41.30588	-107.75271
P70016W	05/10/1985	Complete	--	MON	015N	092W	5	NE1/4NE1/4	0	72.0	41.30589	-107.76712
P70017W	05/10/1985	Complete	--	MON	015N	092W	5	NE1/4NE1/4	0	34.0	41.30589	-107.76712
P70021W	05/10/1985	Complete	--	MON	015N	092W	5	SW1/4NE1/4	0	27.0	41.30235	-107.77193
P103904W	09/24/1996	Complete	--	MON	015N	092W	17	SE1/4NW1/4	0	14.2	41.27226	-107.77671
P103905W	09/24/1996	Complete	--	MON	015N	092W	17	SE1/4NW1/4	0	20.0	41.27226	-107.77671
P103906W	09/24/1996	Complete	--	MON	015N	092W	17	SE1/4NW1/4	0	17.0	41.27226	-107.77671
P104655W	12/06/1996	Incomplete	--	MIS	015N	092W	17	SE1/4NW1/4	5	29.0	41.27226	-107.77671
P112143W	09/30/1998	Complete	--	MON	015N	092W	17	SE1/4NW1/4	0	12.5	41.27226	-107.77671
P138675W	08/31/2001	Complete	--	MIS	015N	092W	17	SE1/4NW1/4	1.5	22.0	41.27226	-107.77671
P145959W	07/15/2002	--	Devon Energy Production Co., LP	MIS	015N	092W	17	SE1/4NW1/4	0.2	23.0	41.27226	-107.77671
P70693W	07/05/1985	Complete	--	MON	015N	092W	17	SE1/4NW1/4	0	20.0	41.27226	-107.77671
P70694W	07/05/1985	Complete	--	MON	015N	092W	17	SW1/4NW1/4	0	11.0	41.27342	-107.78150
P70695W	07/05/1985	Complete	--	MON	015N	092W	17	NE1/4NW1/4	0	20.0	41.27776	-107.77672



# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P70696W	07/05/1985	Complete	--	MON	015N	092W	17	SE1/4NW1/4	0	16.0	41.27226	-107.77671
P70697W	07/05/1985	Complete	--	MON	015N	092W	17	SE1/4NW1/4	0	11.0	41.27226	-107.77671
P70698W	07/05/1985	Complete	--	MON	015N	092W	17	SE1/4SW1/4	0	11.0	41.26617	-107.77669
P113242W	12/03/1998	--	SHEEHAN RANCHES	STK	015N	093W	3	NW1/4NE1/4	0	0.0	41.30644	-107.84779
P179158W	01/17/2007	--	Patrick & Judith Sheehan	MIS; STK	015N	093W	3	NW1/4NE1/4	50	--	41.30644	-107.84779
P17358W	12/20/1972	Complete	--	STK	015N	093W	6	SW1/4SW1/4	5	315.0	41.29579	-107.91477
P170496W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	NE1/4NW1/4	58	--	41.39639	-107.71907
P170497W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	NE1/4NE1/4	58	--	41.39636	-107.70944
P170498W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	SW1/4NE1/4	58	--	41.38918	-107.71426
P170499W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	SE1/4SE1/4	58	--	41.38193	-107.70944
P170500W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	SW1/4NW1/4	58	--	41.38919	-107.72389
P170501W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	SE1/4NW1/4	58	--	41.38919	-107.71907
P170502W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	NW1/4SW1/4	58	--	41.38557	-107.72388
P170503W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	SE1/4SW1/4	58	--	41.38194	-107.71907
P170504W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	NW1/4SE1/4	58	--	41.38556	-107.71426
P170505W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	2	SE1/4SE1/4	58	--	41.38193	-107.70944
P170506W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	NE1/4NW1/4	58	--	41.39638	-107.73832
P170507W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	NE1/4NE1/4	58	--	41.39637	-107.72870
P170508W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	SW1/4NE1/4	58	--	41.38918	-107.73351
P170509W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	SE1/4NE1/4	58	--	41.38919	-107.72870
P170510W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	SW1/4NW1/4	58	--	41.38918	-107.74312
P170511W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	SE1/4NW1/4	58	--	41.38918	-107.73831
P170512W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	NW1/4SW1/4	58	--	41.38556	-107.74312
P170513W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	SE1/4SW1/4	58	--	41.38194	-107.73831
P170514W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	NW1/4SE1/4	58	--	41.38557	-107.73350
P170515W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	3	SE1/4SE1/4	58	--	41.38194	-107.72869
P170545W	08/18/2005	--	Steve F. Adams	MIS	016N	092W	5	NE1/4SE1/4	10	--	41.38560	-107.76714
P186105W	03/06/2008	Unadjudicated	NABORS DRILLING USA, LP	MIS	016N	092W	5	NE1/4SE1/4	60	880.0	41.38716	-107.76491
P74765W	06/09/1987	Complete	--	MON	016N	092W	5	SW1/4SE1/4	0	32.0	41.38198	-107.77194
P6658P	12/31/1916	Complete	GEORGE W. DEW	DOM; STK	016N	092W	7	SE1/4NE1/4	10	440.0	41.37473	-107.78636
P74767W	06/09/1987	Complete	--	MON	016N	092W	8	SE1/4SE1/4	0	22.0	41.36912	-107.76713
P170844W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	NW1/4NE1/4	58	--	41.37832	-107.73350
P170845W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	SE1/4NE1/4	58	--	41.37470	-107.72870
P170846W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	NW1/4NW1/4	58	--	41.37832	-107.74312
P170847W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	SE1/4NW1/4	58	--	41.37470	-107.73831
P170848W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	NW1/4SE1/4	58	--	41.37107	-107.73350
P170849W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	SE1/4SE1/4	58	--	41.36745	-107.72870
P170850W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	NW1/4SW1/4	58	--	41.37108	-107.74312
P170851W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	10	SE1/4SW1/4	58	--	41.36745	-107.73831
P170384W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	SE1/4SE1/4	58	--	41.36744	-107.70945

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P170852W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	NW1/4NE1/4	58	--	41.37831	-107.71426
P170853W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	SE1/4NE1/4	58	--	41.37468	-107.70945
P170854W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	NW1/4NW1/4	58	--	41.37832	-107.72388
P170855W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	SE1/4NW1/4	58	--	41.37469	-107.71907
P170856W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	NW1/4SE1/4	58	--	41.37106	-107.71426
P170857W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	NW1/4SW1/4	58	--	41.37107	-107.72389
P170858W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	11	SE1/4SW1/4	58	--	41.36744	-107.71907
P255W	10/15/1959	Complete	FRANK WILLIAMS	STK	016N	092W	17	NW1/4SE1/4	11.5	330.0	--	--
P74768W	06/09/1987	Complete	--	MON	016N	092W	20	NE1/4SE1/4	0	22.0	41.34212	-107.76712
P170898W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	NW1/4NE1/4	58	--	41.34934	-107.75272
P170899W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	SE1/4NE1/4	58	--	41.34571	-107.74792
P170900W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	NW1/4NW1/4	58	--	41.34934	-107.76232
P170901W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	SE1/4NW1/4	58	--	41.34571	-107.75752
P170902W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	NW1/4SE1/4	58	--	41.34209	-107.75272
P170903W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	SE1/4SE1/4	58	--	41.33846	-107.74792
P170904W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	NW1/4SW1/4	58	--	41.34221	-107.76231
P170905W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	21	SE1/4SW1/4	58	--	41.33846	-107.75752
P170906W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	NW1/4NE1/4	58	--	41.34933	-107.73351
P170907W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	SE1/4NE1/4	58	--	41.34571	-107.72870
P170908W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	NW1/4NW1/4	58	--	41.34933	-107.74312
P170909W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	SE1/4NW1/4	58	--	41.34571	-107.73831
P170910W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	NW1/4SE1/4	58	--	41.34208	-107.73351
P170911W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	SE1/4SE1/4	58	--	41.33846	-107.72870
P170912W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	NW1/4SW1/4	58	--	41.34208	-107.74312
P170913W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	22	SE1/4SW1/4	58	--	41.33846	-107.73831
P170450W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	SE1/4NE1/4	58	--	41.34570	-107.70947
P170451W	09/02/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	SE1/4SE1/4	58	--	41.33845	-107.70947
P170914W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	NW1/4NE1/4	58	--	41.34932	-107.71428
P170915W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	NW1/4NW1/4	58	--	41.34933	-107.72390
P170916W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	SE1/4NW1/4	58	--	41.34570	-107.71909
P170917W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	NW1/4SE1/4	58	--	41.34208	-107.71428
P170918W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	NW1/4SW1/4	58	--	41.34208	-107.72390
P170919W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	23	SE1/4SW1/4	58	--	41.33846	-107.71909
P170920W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	NW1/4NE1/4	58	--	41.33483	-107.73351
P170921W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	SE1/4NE1/4	58	--	41.33121	-107.72870
P170922W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	NW1/4NW1/4	58	--	41.33483	-107.74312
P170923W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	SE1/4NW1/4	58	--	41.33121	-107.73831
P170924W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	NW1/4SE1/4	58	--	41.32758	-107.73350
P170925W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	SE1/4SE1/4	58	--	41.32396	-107.72870
P170926W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	NW1/4SW1/4	58	--	41.32758	-107.74311

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P170927W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	27	SE1/4SW1/4	58	--	41.32396	-107.73831
P170928W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	28	NW1/4NE1/4	58	--	41.33484	-107.75271
P170929W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	28	SE1/4NE1/4	58	--	41.33121	-107.74792
P170930W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	28	SE1/4NW1/4	58	--	41.33121	-107.75752
P170931W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	28	NW1/4SE1/4	58	--	41.32758	-107.75271
P170932W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	28	SE1/4SE1/4	58	--	41.32396	-107.74791
P170933W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	28	SE1/4SW1/4	58	--	41.32396	-107.75751
P70061W	05/10/1985	Complete	--	MON	016N	092W	28	SW1/4SW1/4	0	45.0	41.32396	-107.76231
P78958W	01/17/1989	Complete	--	MON	016N	092W	28	SE1/4SW1/4	0	47.0	41.32396	-107.75751
P70063W	05/10/1985	Complete	--	MON	016N	092W	29	SE1/4SE1/4	0	55.0	41.32396	-107.76711
P70066W	05/10/1985	Complete	--	MON	016N	092W	29	SE1/4SE1/4	0	80.0	41.32396	-107.76711
P70067W	05/10/1985	Complete	--	MON	016N	092W	29	SE1/4SE1/4	0	65.0	41.32396	-107.76711
P70068W	05/10/1985	Complete	--	MON	016N	092W	29	SE1/4SE1/4	0	15.0	41.32396	-107.76711
P70069W	05/10/1985	Complete	--	MON	016N	092W	29	SE1/4SE1/4	0	52.0	41.32396	-107.76711
P70070W	05/10/1985	Complete	--	MON	016N	092W	29	NW1/4SE1/4	0	80.0	41.32758	-107.77192
P70072W	05/10/1985	Complete	--	MON	016N	092W	29	NE1/4SW1/4	0	60.0	41.32758	-107.77673
P70078W	05/10/1985	Complete	--	MON	016N	092W	29	SE1/4SE1/4	0	55.0	41.32396	-107.76711
P17359W	12/20/1972	Complete	--	STK	016N	092W	31	NE1/4SW1/4	5	365.0	41.31307	-107.79594
P70077W	05/10/1985	Complete	--	MON	016N	092W	32	NE1/4NE1/4	0	55.0	41.32033	-107.76711
P78959W	01/17/1989	Complete	--	MON	016N	092W	32	SE1/4NE1/4	0	45.0	41.31670	-107.76711
P70006W	05/10/1985	Complete	--	MON	016N	092W	33	SW1/4NE1/4	0	39.0	41.31670	-107.75271
P70007W	05/10/1985	Complete	--	MON	016N	092W	33	NE1/4SW1/4	0	41.2	41.31308	-107.75751
P70008W	05/10/1985	Complete	--	MON	016N	092W	33	NE1/4SW1/4	0	51.1	41.31308	-107.75751
P70009W	05/10/1985	Complete	--	MON	016N	092W	33	NW1/4SW1/4	0	66.0	41.31308	-107.76231
P70010W	05/10/1985	Complete	--	MON	016N	092W	33	NW1/4SW1/4	0	80.0	41.31308	-107.76231
P70011W	05/10/1985	Complete	--	MON	016N	092W	33	NW1/4SW1/4	0	38.0	41.31308	-107.76231
P70012W	05/10/1985	Complete	--	MON	016N	092W	33	SW1/4NW1/4	0	43.0	41.31670	-107.76231
P70014W	05/10/1985	Complete	--	MON	016N	092W	33	SW1/4SW1/4	0	67.0	41.30945	-107.76231
P70015W	05/10/1985	Complete	--	MON	016N	092W	33	SW1/4SW1/4	0	9.0	41.30945	-107.76231
P78960W	01/17/1989	Complete	--	MON	016N	092W	33	SW1/4NW1/4	0	42.0	41.31670	-107.76231
P78961W	01/17/1989	Complete	--	MON	016N	092W	33	NW1/4NW1/4	0	41.0	41.32033	-107.76231
P78962W	01/17/1989	Complete	--	MON	016N	092W	33	NW1/4NW1/4	0	40.0	41.32033	-107.76231
P78963W	01/17/1989	Complete	--	MON	016N	092W	33	SW1/4SW1/4	0	39.0	41.30945	-107.76231
P78964W	01/17/1989	Complete	--	MON	016N	092W	33	SW1/4SW1/4	0	41.0	41.30945	-107.76231
P170934W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	NW1/4NE1/4	58	--	41.32033	-107.73350
P170935W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	SE1/4NE1/4	58	--	41.31671	-107.72869
P170936W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	NW1/4NW1/4	58	--	41.32033	-107.74311
P170937W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	SE1/4NW1/4	58	--	41.31671	-107.73830
P170938W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	NW1/4SE1/4	58	--	41.31308	-107.73349
P170939W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	SE1/4SE1/4	58	--	41.30946	-107.72869

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P170940W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	NW1/4SW1/4	58	--	41.31308	-107.74310
P170941W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	34	SE1/4SW1/4	58	--	41.30945	-107.73829
P170942W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	NW1/4NE1/4	58	--	41.32033	-107.71428
P170943W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	SE1/4NE1/4	58	--	41.31671	-107.70947
P170944W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	NW1/4NW1/4	58	--	41.32033	-107.72389
P170945W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	SE1/4NW1/4	58	--	41.31671	-107.71908
P170946W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	NW1/4SE1/4	58	--	41.31308	-107.71428
P170947W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	SE1/4SE1/4	58	--	41.30946	-107.70947
P170948W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	NW1/4SW1/4	58	--	41.31308	-107.72388
P170949W	10/14/2005	--	Double Eagle Petroleum Company	CBM	016N	092W	35	SE1/4SW1/4	58	--	41.30946	-107.71908
P95447W	05/24/1994	--	BP America Production Co.	MIS	016N	093W	7	SE1/4NW1/4	--	--	41.37567	-107.91032
P149036W	01/29/2003	Complete	BP America Production Co.	MIS	016N	093W	8	NW1/4SE1/4	84	783.0	41.37193	-107.88623
P190145W	07/14/2008	Complete	BP America Production Co.	MIS	016N	093W	13	NW1/4NW1/4	120	1,630.0	41.36446	-107.81840
P149037W	01/29/2003	Complete	BP America Production Co.	MIS	016N	093W	14	SW1/4SE1/4	120	9,223.0	41.35348	-107.82867
P17365P	01/31/1966	Complete	BP America Production Co.	STK	016N	093W	14	NW1/4NW1/4	5	240.0	41.36442	-107.83822
P75633W	10/01/1987	Incomplete	BP America Production Co.	MIS	016N	093W	32	SE1/4NW1/4	50	500.0	41.31746	-107.89090
P120114W	11/03/1999	--	BP America Production Co.	MIS	016N	094W	1	NW1/4SW1/4	150	--	41.38667	-107.93368
P183692W	11/05/2007	--	BP America Production Co.	MIS	016N	094W	4	NE1/4NE1/4	175	--	41.39737	-107.97671
P191487W	09/25/2009	Incomplete	BP America Production Co.	STK	016N	094W	9	SW1/4SE1/4	--	--	41.36961	-107.97975
P17366P	10/26/1967	Complete	BP America Production Co.	STK	016N	094W	12	NE1/4NE1/4	5	140.0	41.37933	-107.91932
P191485W	09/25/2009	Incomplete	BP America Production Co.	STK	016N	094W	20	NE1/4NW1/4	25	--	41.35174	-108.00675
P17367P	10/26/1967	Complete	BP America Production Co.	STK	016N	094W	24	SE1/4SE1/4	5	207.0	41.33937	-107.91932
P157271W	03/25/2004	Incomplete	BP America Production Co.	MIS	016N	095W	1	NW1/4NW1/4	200	--	41.39747	-108.04769
P189204W	10/21/2008	Incomplete	BP America Production Co.	MIS	016N	095W	1	NW1/4NW1/4	200	--	41.39692	-108.04767
P154096W	09/17/2003	Complete	BP America Production Co.	STK	016N	095W	11	SE1/4NW1/4	6	830.0	41.37604	-108.06223
P189601W	11/26/2008	Fully Adjudicated	BP America Production Co.	MIS	017N	092W	3	NW1/4SE1/4	50	--	41.47459	-107.74611
P139582W	07/11/2001	--	BP America Production Co.	MIS	017N	092W	5	NW1/4SE1/4	50	--	41.47539	-107.78435
P189600W	11/26/2008	Complete	BP America Production Co.	MIS	017N	092W	5	NW1/4SE1/4	50	850.0	41.47674	-107.78503
P17360W	12/20/1972	Complete	BP America Production Co.	STK	017N	092W	8	SE1/4NW1/4	5	100.0	41.46427	-107.78972
P27847W	09/17/1974	Complete	BP America Production Co.	DOM; STK	017N	092W	14	NW1/4NW1/4	3	250.0	41.45328	-107.73674
P70047W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	14	SW1/4SW1/4	0	95.0	41.44250	-107.73674
P169453W	07/13/2005	Complete	BP America Production Co.	DOM; MIS; STK	017N	092W	15	SW1/4SW1/4	20	880.0	41.44250	-107.75588
P173454W	02/28/2006	--	BP America Production Co.	MIS	017N	092W	15	SE1/4SW1/4	25	2,600.0	41.44250	-107.75107
P56791W	05/05/1981	Complete	BP America Production Co.	STK	017N	092W	15	SE1/4SW1/4	25	2,600.0	41.44250	-107.75107
P70035W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	SE1/4SW1/4	0	20.0	41.44250	-107.75107
P70040W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	SW1/4SW1/4	0	20.0	41.44250	-107.75588
P70041W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	SE1/4SW1/4	0	47.0	41.44250	-107.75107
P70042W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	SE1/4SW1/4	0	20.0	41.44250	-107.75107
P70043W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	SE1/4SW1/4	0	20.0	41.44250	-107.75107
P70044W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SW1/4	0	82.0	41.44612	-107.75106

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P70045W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NW1/4SE1/4	0	42.0	41.44610	-107.74627
P70046W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NW1/4SE1/4	0	32.0	41.44610	-107.74627
P70048W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SE1/4	0	49.0	41.44608	-107.74150
P70049W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SW1/4	0	40.0	41.44612	-107.75106
P70050W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NW1/4SE1/4	0	15.0	41.44610	-107.74627
P70051W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SE1/4	0	82.0	41.44608	-107.74150
P70052W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SE1/4	0	72.0	41.44608	-107.74150
P70053W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SE1/4	0	55.0	41.44608	-107.74150
P70054W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SE1/4	0	35.0	41.44608	-107.74150
P70055W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SE1/4	0	82.0	41.44608	-107.74150
P70056W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NE1/4SE1/4	0	75.0	41.44608	-107.74150
P70057W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	SW1/4NE1/4	0	42.0	41.44973	-107.74626
P70059W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	15	NW1/4NE1/4	0	40.0	41.45339	-107.74625
P70037W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	16	SE1/4SE1/4	0	45.0	41.44250	-107.76069
P70038W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	16	SE1/4SE1/4	0	45.0	41.44250	-107.76069
P70027W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	SE1/4NW1/4	0	40.0	41.43531	-107.75106
P70028W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	42.0	41.43888	-107.75587
P70031W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	82.0	41.43888	-107.75587
P70032W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	62.0	41.43888	-107.75587
P70033W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	32.0	41.43888	-107.75587
P70034W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	42.0	41.43888	-107.75587
P70036W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	42.0	41.43888	-107.75587
P70039W	05/10/1985	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	32.0	41.43888	-107.75587
P78955W	01/17/1989	Complete	BP America Production Co.	MON	017N	092W	22	NW1/4NW1/4	0	28.0	41.43888	-107.75587
P170875W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	24	NW1/4SE1/4	58	--	41.43221	-107.70712
P170876W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	24	SE1/4SE1/4	58	--	41.42877	-107.70198
P170877W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	24	NW1/4SW1/4	58	--	41.43181	-107.71736
P170878W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	24	SE1/4SW1/4	58	--	41.42837	-107.71222
P170879W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	25	NW1/4NE1/4	58	--	41.42493	-107.70708
P170881W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	25	NW1/4NW1/4	58	--	41.42453	-107.71735
P170882W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	25	SE1/4NW1/4	58	--	41.42109	-107.71222
P170883W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	25	NW1/4SE1/4	58	--	41.41766	-107.70707
P170884W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	25	SE1/4SE1/4	58	--	41.41427	-107.70193
P170885W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	25	NW1/4SW1/4	58	--	41.41725	-107.71735
P170886W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	25	SE1/4SW1/4	58	--	41.41384	-107.71222
P170516W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	NW1/4NE1/4	58	--	41.42446	-107.72720
P170517W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	NW1/4NW1/4	58	--	41.42449	-107.73675
P170518W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	SE1/4NW1/4	58	--	41.42084	-107.73197
P170519W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	NW1/4SW1/4	58	--	41.41722	-107.73676
P170520W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	SE1/4SW1/4	58	--	41.41356	-107.73195

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P170521W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	NW1/4SE1/4	58	--	41.41718	-107.72716
P170540W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	SE1/4NE1/4	58	--	41.42080	-107.72233
P170541W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	26	SE1/4SE1/4	58	--	41.41352	-107.72233
P97449W	10/12/1994	--	BP America Production Co.	STK	017N	092W	26	NE1/4SE1/4	0	475.0	41.41716	-107.72232
P74763W	06/09/1987	Complete	BP America Production Co.	MON	017N	092W	28	SE1/4SW1/4	0	25.0	41.41362	-107.77010
P78956W	01/17/1989	Complete	BP America Production Co.	MON	017N	092W	28	SE1/4SW1/4	0	28.0	41.41362	-107.77010
P78957W	01/17/1989	Complete	BP America Production Co.	MON	017N	092W	28	SW1/4SW1/4	0	62.0	41.41360	-107.77488
P83907W	11/01/1990	Complete	BP America Production Co.	STK	017N	092W	33	SE1/4NE1/4	6	384.0	41.40646	-107.76040
P170522W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	34	NW1/4NE1/4	58	--	41.40998	-107.74619
P170523W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	34	SE1/4NE1/4	58	--	41.40632	-107.74147
P170524W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	34	NW1/4SE1/4	58	--	41.40296	-107.74534
P170525W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	34	SE1/4SE1/4	58	--	41.39977	-107.74021
P170527W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	35	SE1/4SW1/4	58	--	41.39972	-107.73072
P170528W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	35	NW1/4SE1/4	58	--	41.40288	-107.72627
P170529W	09/02/2005	--	BP America Production Co.	CBM	017N	092W	35	SE1/4SE1/4	58	--	41.39972	-107.72114
P170887W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	35	NW1/4NE1/4	58	--	41.40991	-107.72703
P170888W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	35	SE1/4NE1/4	58	--	41.40627	-107.72224
P170889W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	35	NW1/4NW1/4	58	--	41.40994	-107.73670
P170890W	10/14/2005	--	BP America Production Co.	CBM	017N	092W	35	SE1/4NW1/4	58	--	41.40629	-107.73146
P171981W	11/30/2005	--	BP America Production Co.	MIS	017N	093W	3	SW1/4SW1/4	150	--	41.47270	-107.86983
P184334W	12/17/2007	Incomplete	BP America Production Co.	MIS	017N	093W	3	NW1/4NE1/4	100	--	41.48474	-107.86119
P171980W	11/30/2005	--	BP America Production Co.	MIS	017N	093W	10	SW1/4NW1/4	150	--	41.46535	-107.86978
P64310W	06/09/1983	Complete	BP America Production Co.	STK	017N	093W	15	SW1/4NW1/4	7	1,040.0	41.45083	-107.86963
P139581W	07/03/2001	--	BP America Production Co.	MIS	017N	093W	21	NW1/4SW1/4	0	--	41.43260	-107.88883
P177391W	09/15/2006	--	BP America Production Co.	MIS	017N	093W	21	NW1/4SW1/4	200	--	41.43260	-107.88883
P183109W	06/04/2007	Incomplete	BP America Production Co.	MIS	017N	093W	21	NW1/4SW1/4	0	--	41.43260	-107.88883
P174021W	04/06/2006	--	BP America Production Co.	MIS	017N	093W	25	SW1/4SW1/4	100	660.0	41.41433	-107.83062
P175189W	04/19/2006	--	BP America Production Co.	MIS	017N	093W	27	NW1/4SE1/4	150	--	41.41801	-107.85971
P171984W	12/01/2005	--	BP America Production Co.	MIS	017N	093W	31	NE1/4SW1/4	50	--	41.40401	-107.92247
P133868W	04/02/2001	--	BP America Production Co.	MIS	017N	093W	35	SW1/4SW1/4	150	--	41.40021	-107.85011
P64311W	06/09/1983	Complete	BP America Production Co.	STK	017N	093W	35	SW1/4SW1/4	7	1,200.0	41.40021	-107.85011
P17370P	10/26/1967	Complete	BP America Production Co.	STK	017N	094W	4	NW1/4NW1/4	5	252.0	41.48394	-108.00404
P152045W	06/18/2003	--	BP America Production Co.	MIS	017N	094W	9	NW1/4SW1/4	80	--	41.46218	-108.00391
P154978W	10/31/2003	--	BP America Production Co.	MIS	017N	094W	13	NW1/4SW1/4	50	--	41.44772	-107.94592
P176012W	04/19/2006	Complete	BP America Production Co.	MIS	017N	094W	13	NW1/4SW1/4	150	420.0	41.44772	-107.94592
P194217W	11/15/2010	Complete	BP America Production Co.	MIS	017N	094W	13	NW1/4SW1/4	150	420.0	41.44647	-107.94427
P152753W	07/30/2003	Complete	BP America Production Co.	STK	017N	094W	19	SW1/4SW1/4	12	500.0	41.42960	-108.04255
P71969W	10/23/1985	Complete	BP America Production Co.	STK	017N	094W	21	SE1/4SW1/4	25	400.0	41.42953	-107.99894
P17371P	10/26/1967	Complete	BP America Production Co.	STK	017N	094W	26	NE1/4NE1/4	5	200.0	41.42600	-107.95067
P89063W	04/14/1992	Complete	BP America Production Co.	DOM	017N	094W	27	NE1/4NE1/4	10	120.0	41.42601	-107.96996

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P187982W	06/02/2008	Incomplete	BP America Production Co.	MIS; MIS	017N	095W	1	SW1/4NW1/4	80	--	41.47971	-108.06187
P183450W	08/31/2007	--	BP America Production Co.	MIS	017N	095W	2	NW1/4SE1/4	200	--	41.47661	-108.07139
P191484W	09/25/2009	Incomplete	BP America Production Co.	STK	017N	095W	5	SE1/4SW1/4	25	--	41.47270	-108.13371
P152752W	07/30/2003	--	BP America Production Co.	STK	017N	095W	13	NE1/4SW1/4	25	--	41.44771	-108.05709
P173027W	01/19/2006	--	BP America Production Co.	MIS	017N	095W	18	SW1/4NE1/4	60	1,120.0	41.45115	-108.14805
P188950W	09/19/2008	Fully Adjudicated	BP America Production Co.	MIS	018N	092W	1	NW1/4SE1/4	50	--	41.56253	-107.70672
P189034W	10/07/2008	Fully Adjudicated	BP America Production Co.	MIS	018N	092W	3	NE1/4SE1/4	50	--	41.56253	-107.74023
P186057W	03/12/2008	Incomplete	BP America Production Co.	MIS	018N	092W	7	SW1/4NE1/4	50	--	41.55195	-107.80254
P135632W	06/06/2001	--	BP America Production Co.	MIS	018N	092W	9	SE1/4NW1/4	50	--	41.55204	-107.76913
P187974W	08/19/2008	Incomplete	BP America Production Co.	MIS; MIS	018N	092W	11	SW1/4NE1/4	50	--	41.55213	-107.72590
P175171W	05/12/2006	--	BP America Production Co.	MIS	018N	092W	16	NE1/4SE1/4	200	--	41.53388	-107.75943
P191991W	10/09/2009	Complete	BP America Production Co.	MIS	018N	092W	19	NE1/4SW1/4	50	800.0	41.51950	-107.80731
P185940W	02/06/2008	Incomplete	BP America Production Co.	MIS	018N	092W	21	NE1/4SW1/4	50	--	41.51892	-107.76889
P188725W	08/22/2008	Incomplete	BP America Production Co.	MIS	018N	092W	23	SW1/4NW1/4	50	--	41.52258	-107.73535
P101327W	11/29/1995	Complete	BP America Production Co.	STK	018N	092W	25	SW1/4SE1/4	6	450.0	41.50145	-107.70673
P105038W	02/24/1997	Incomplete	BP America Production Co.	MIS	018N	092W	30	SW1/4SE1/4	70	820.0	41.50122	-107.80243
P149038W	01/29/2003	Complete	BP America Production Co.	MIS	018N	092W	30	SW1/4SE1/4	70	820.0	41.50122	-107.80243
P100202W	09/05/1995	Complete	BP America Production Co.	STK	018N	092W	31	SW1/4SW1/4	25	520.0	41.48715	-107.81193
P111248W	07/23/1998	Incomplete	BP America Production Co.	MIS	018N	092W	34	NW1/4SE1/4		-	41.49056	-107.74501
P101328W	11/29/1995	Complete	BP America Production Co.	STK	018N	093W	1	SW1/4SW1/4	6	420.0	41.55962	-107.83089
P157786W	04/09/2004	--	BP America Production Co.	MIS	018N	093W	1	SW1/4SW1/4	150	--	41.55962	-107.83089
P189473W	12/29/2008	Unadjudicated	BP America Production Co.	MIS	018N	093W	1	SW1/4SW1/4	150	--	41.55913	-107.83085
P156487W	01/27/2004	Complete	BP America Production Co.	STK	018N	093W	2	SW1/4NW1/4	5	300.0	41.56686	-107.85044
P70757W	07/29/1985	Complete	BP America Production Co.	STK	018N	093W	3	SW1/4SW1/4	25	300.0	41.55961	-107.86969
P182024W	05/24/2007	Complete	BP America Production Co.	MIS	018N	093W	5	SW1/4NE1/4	100	--	41.56708	-107.89876
P66393W	02/15/1984	Complete	BP America Production Co.	STK	018N	093W	5	NW1/4SW1/4	10	740.0	41.56366	-107.90849
P64538W	06/24/1983	Complete	BP America Production Co.	STK	018N	093W	9	NW1/4SW1/4	5	560.0	41.54893	-107.88900
P156486W	01/27/2004	Complete	BP America Production Co.	STK	018N	093W	10	SW1/4NW1/4	5	300.0	41.55233	-107.86967
P70758W	07/29/1985	Complete	BP America Production Co.	STK	018N	093W	11	SE1/4SW1/4	12	330.0	41.54513	-107.84549
P101324W	11/29/1995	Complete	BP America Production Co.	STK	018N	093W	13	SE1/4SE1/4	25	555.0	41.53048	-107.81684
P101329W	11/29/1995	Complete	BP America Production Co.	STK	018N	093W	15	NE1/4SW1/4	5	306.0	41.53414	-107.86474
P131973W	01/16/2001	--	BP America Production Co.	MIS	018N	093W	15	SE1/4NW1/4	0	--	41.53779	-107.86477
P173073W	02/10/2006	--	BP America Production Co.	MIS	018N	093W	15	SE1/4NW1/4	50	--	41.53779	-107.86477
P64537W	06/24/1983	Complete	BP America Production Co.	STK	018N	093W	17	SW1/4SW1/4	10	440.0	41.53101	-107.90831
P180338W	03/07/2007	Complete	BP America Production Co.	MIS	018N	093W	21	SE1/4SW1/4	60	--	41.51808	-107.88568
P64536W	06/24/1983	Complete	BP America Production Co.	STK	018N	093W	21	SE1/4SW1/4	20	780.0	41.51624	-107.88402
P70759W	07/29/1985	Complete	BP America Production Co.	STK	018N	093W	23	SW1/4SW1/4	12	620.0	41.51611	-107.85018
P182022W	05/24/2007	--	BP America Production Co.	MIS	018N	093W	25	NW1/4SE1/4	100	--	41.50525	-107.82173
P120119W	10/29/1999	--	BP America Production Co.	MIS	018N	093W	27	SW1/4SW1/4	150	--	41.50157	-107.86934
P66579W	03/15/1984	Complete	BP America Production Co.	STK	018N	093W	27	SW1/4SW1/4	8	680.0	41.50157	-107.86934

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P66578W	03/15/1984	Complete	BP America Production Co.	STK	018N	093W	29	SW1/4SW1/4	8	620.0	41.50197	-107.90809
P168408W	06/07/2005	--	BP America Production Co.	MIS	018N	093W	33	SW1/4SW1/4	50	--	41.48737	-107.88875
P66580W	03/15/1984	Complete	BP America Production Co.	STK	018N	093W	33	NW1/4SW1/4	6	720.0	41.49098	-107.88875
P180336W	03/07/2007	--	BP America Production Co.	MIS	018N	093W	34	SW1/4SW1/4	60	--	41.48727	-107.86952
P183110W	06/04/2007	Incomplete	BP America Production Co.	MIS	018N	093W	34	SW1/4SW1/4	0	--	41.48727	-107.86952
P194745W	01/05/2011	Complete	BP America Production Co.	MIS	018N	093W	35	SW1/4SW1/4	50	600.0	41.48903	-107.84851
P17373P	10/26/1967	Complete	BP America Production Co.	STK	018N	094W	22	SE1/4SE1/4	5	150.0	41.51631	-107.97067
P194748W	01/13/2011	Incomplete	BP America Production Co.	MIS	018N	094W	25	SE1/4NW1/4	100	--	41.50917	-107.94113
P175367W	07/11/2006	--	BP America Production Co.	MIS	018N	094W	28	NE1/4SW1/4	25	--	41.50427	-108.00181
P165537W	02/23/2005	--	BP America Production Co.	MIS	018N	094W	31	NW1/4NE1/4	50	--	41.49806	-108.03335
P165337W	02/10/2005	--	BP America Production Co.	MIS	018N	094W	33	NE1/4SW1/4	50	--	41.49109	-107.99936
P158015W	04/13/2004	Complete	BP America Production Co.	STK	018N	095W	1	SE1/4SW1/4	14	940.0	41.55966	-108.05744
P154377W	10/06/2003	Complete	BP America Production Co.	STK	018N	095W	7	SE1/4SW1/4	12	940.0	41.54491	-108.15360
P158016W	04/13/2004	Complete	BP America Production Co.	STK	018N	095W	11	SE1/4SW1/4	12	600.0	41.54519	-108.07669
P175170W	05/12/2006	--	BP America Production Co.	MIS	018N	095W	14	SE1/4NE1/4	200	--	41.53798	-108.06716
P175201W	06/13/2006	--	BP America Production Co.	MIS	018N	095W	18	SE1/4SE1/4	200	--	41.53047	-108.14395
P152778W	07/02/2003	--	BP America Production Co.	MIS	018N	095W	19	SE1/4SW1/4	200	--	41.51601	-108.15317
P190924W	07/01/2009	Complete	BP America Production Co.	MIS	018N	095W	19	SE1/4SW1/4	75	--	41.51554	-108.15311
P178687W	11/16/2006	--	BP America Production Co.	MIS	018N	095W	22	NW1/4NW1/4	200	--	41.52711	-108.10085
P191486W	09/25/2009	Incomplete	BP America Production Co.	STK	018N	095W	35	SW1/4SE1/4	25	--	41.48594	-108.07283
P105059W	02/21/1997	Complete	BP America Production Co.	STK	018N	096W	1	NW1/4NW1/4	15	440.0	41.57041	-108.17789
P194620W	12/20/2010	Incomplete	BP America Production Co.	STK	018N	096W	7	NE1/4NW1/4	25	--	41.55569	-108.26914
P63762W	03/03/1983	Complete	BP America Production Co.	STK	018N	096W	13	NE1/4SW1/4	2	800.0	41.53433	-108.17258
P152923W	08/07/2003	--	BP America Production Co.	MIS	018N	096W	15	NW1/4NW1/4	150	--	41.54155	-108.21592
P74149W	02/27/1987	Complete	BP America Production Co.	STK	018N	096W	20	SE1/4SE1/4	25	350.0	41.51593	-108.24029
P50386W	10/22/1979	Complete	BP America Production Co.	STK	018N	096W	23	SW1/4SW1/4	15	200.0	41.51631	-108.19668
P105058W	02/21/1997	Complete	BP America Production Co.	STK	018N	096W	27	SW1/4SE1/4	0.5	330.0	41.50181	-108.20624
P153419W	08/20/2003	Complete	BP America Production Co.	STK	018N	096W	31	SW1/4SW1/4	10	308.0	41.48738	-108.27314
P178994W	11/22/2006	--	BP America Production Co.	MIS	018N	096W	31	SW1/4SW1/4	80	308.0	41.48738	-108.27314
P11C	10/03/1945	Incomplete	BP America Production Co.	IND	018N	098W	1	NW1/4NW1/4	14	572.0	41.57120	-108.40540
P142768W	10/26/2001	Complete	BP America Production Co.	MIS	018N	098W	1	NW1/4NW1/4	180	2,831.0	41.57120	-108.40540
P26031W	01/22/1974	Fully Adjudicated	BP America Production Co.	MIS	018N	098W	1	NW1/4NE1/4	13	657.0	41.57119	-108.39576
P1883W	03/23/1967	--	BP America Production Co.	IND	018N	099W	1	NW1/4SE1/4	468	4,040.0	41.56405	-108.51102
P6419P	05/31/1962	Complete	BP America Production Co.	STK	019N	091W	5	NW1/4NW1/4	7.5	180.0	41.65644	-107.67995
P128687W	09/05/2000	Complete	BP America Production Co.	STK	019N	091W	7	NW1/4NW1/4	25	260.0	41.64213	-107.69835
P138467W	08/29/2001	Complete	BP America Production Co.	STK	019N	091W	7	NW1/4NW1/4	5	260.0	41.64213	-107.69835
P141758W	01/07/2002	Complete	BP America Production Co.	STK	019N	091W	9	NE1/4NE1/4	4	400.0	41.64164	-107.64483
P6416P	05/31/1962	Complete	BP America Production Co.	STK	019N	091W	11	SE1/4NW1/4	7.5	250.0	41.63771	-107.61584
P55868W	03/05/1981	Complete	BP America Production Co.	STK	019N	091W	35	SW1/4SE1/4	20	100.0	41.57261	-107.61170
P101390W	03/10/1994	Incomplete	BP America Production Co.	MIS	019N	092W	2	NW1/4SE1/4	300	3,755.0	41.64948	-107.72682



# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P53684W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	3	SW1/4SW1/4	0	91.0	41.64570	-107.75555
P53700W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	3	NE1/4SW1/4	0	160.0	41.64937	-107.75084
P101009W	12/01/1995	Complete	BP America Production Co.	STK	019N	092W	5	NW1/4SW1/4	25	840.0	41.64930	-107.79424
P149530W	02/27/2003	--	BP America Production Co.	STK	019N	092W	6	NW1/4NE1/4	10	--	41.65664	-107.80399
P101008W	12/01/1995	Complete	BP America Production Co.	STK	019N	092W	7	SW1/4SW1/4	25	560.0	41.63138	-107.81281
P168057W	05/25/2005	--	BP America Production Co.	MIS	019N	092W	7	SW1/4SW1/4	50	--	41.63138	-107.81281
P53663W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	9	NE1/4NE1/4	0	423.0	41.64207	-107.76031
P53672W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	9	NE1/4NE1/4	0	85.0	41.64207	-107.76031
P53678W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	9	NE1/4NE1/4	0	270.0	41.64207	-107.76031
P53679W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	9	NE1/4NE1/4	0	145.0	41.64207	-107.76031
P53681W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	9	NE1/4NE1/4	0	115.0	41.64207	-107.76031
P53687W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	9	NE1/4NE1/4	0	160.0	41.64207	-107.76031
P53637W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	11	NW1/4SW1/4	0	130.0	41.63499	-107.73631
P53659W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	11	NW1/4SW1/4	0	223.0	41.63499	-107.73631
P53660W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	11	SW1/4NW1/4	0	273.0	41.63862	-107.73634
P53682W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	11	NW1/4SW1/4	0	35.0	41.63499	-107.73631
P53644W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	13	SW1/4SE1/4	0	40.0	41.61695	-107.70731
P53653W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	15	SE1/4SE1/4	0	86.0	41.61674	-107.74095
P53654W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	15	SE1/4SE1/4	0	122.0	41.61674	-107.74095
P53655W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	15	SE1/4SE1/4	0	142.0	41.61674	-107.74095
P53656W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	15	SE1/4SE1/4	0	85.0	41.61674	-107.74095
P155406W	12/08/2003	--	BP America Production Co.	MIS	019N	092W	17	NW1/4SW1/4	150	--	41.62016	-107.79401
P53649W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	21	NE1/4NE1/4	0	130.0	41.61305	-107.76021
P53651W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	21	NE1/4NE1/4	0	180.0	41.61305	-107.76021
P53652W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	21	NE1/4NE1/4	0	292.0	41.61305	-107.76021
P149393W	11/25/2002	--	BP America Production Co.	MIS	019N	092W	24	NW1/4SW1/4	100	--	41.60608	-107.71690
P187981W	06/02/2008	Incomplete	BP America Production Co.	MIS; MIS	019N	092W	27	SE1/4SW1/4	200	--	41.58736	-107.75029
P53665W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	27	NE1/4NW1/4	0	245.0	41.59857	-107.75045
P53666W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	27	NE1/4NW1/4	0	135.0	41.59857	-107.75045
P53667W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	27	NE1/4NW1/4	0	155.0	41.59857	-107.75045
P53668W	09/02/1980	Complete	BP America Production Co.	MON	019N	092W	27	NE1/4NW1/4	0	188.0	41.59857	-107.75045
P187966W	07/23/2008	Incomplete	BP America Production Co.	MIS; MIS	019N	092W	29	NE1/4SW1/4	50	--	41.59159	-107.78919
P186603W	04/17/2008	Incomplete	BP America Production Co.	STK	019N	092W	35	NE1/4SW1/4	20	--	41.57684	-107.73072
P101326W	11/29/1995	Complete	BP America Production Co.	STK	019N	093W	1	NW1/4NE1/4	6	500.0	41.65674	-107.82238
P194807W	12/20/2010	Complete	BP America Production Co.	MIS	019N	093W	1	NE1/4NE1/4	80	600.0	41.65781	-107.81569
P97297W	10/06/1994	Incomplete	BP America Production Co.	IND; MIS	019N	093W	1	NW1/4SE1/4	20	460.0	41.64958	-107.82244
P177388W	09/08/2006	--	BP America Production Co.	MIS	019N	093W	3	NE1/4SW1/4	50	325.0	41.64969	-107.86565
P183108W	06/04/2007	Incomplete	BP America Production Co.	MIS	019N	093W	3	NW1/4SW1/4	0	325.0	41.64972	-107.87050
P57683W	07/24/1981	Complete	BP America Production Co.	STK	019N	093W	3	NE1/4SW1/4	25	325.0	41.64969	-107.86565
P101325W	11/29/1995	Complete	BP America Production Co.	STK	019N	093W	7	SE1/4SW1/4	25	545.0	41.63221	-107.92317

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P100204W	09/05/1995	Complete	BP America Production Co.	STK	019N	093W	9	NW1/4SW1/4	25	350.0	41.63548	-107.88969
P126752W	07/05/2000	--	BP America Production Co.	MIS	019N	093W	10	SW1/4SW1/4	40	--	41.63168	-107.87037
P57686W	07/24/1981	Complete	BP America Production Co.	STK	019N	093W	11	SW1/4SW1/4	25	528.0	41.63154	-107.85099
P126751W	07/05/2000	--	BP America Production Co.	MIS	019N	093W	14	NE1/4SW1/4	40	--	41.62077	-107.84636
P57685W	07/24/1981	Complete	BP America Production Co.	STK	019N	093W	15	SE1/4SW1/4	25	300.0	41.61720	-107.86571
P101330W	11/29/1995	Complete	BP America Production Co.	STK	019N	093W	17	SE1/4SW1/4	6	400.0	41.61751	-107.90405
P136935W	07/24/2001	Fully Adjudicated	BP America Production Co.	MIS	019N	093W	19	SW1/4SE1/4	20	425.0	41.60320	-107.91815
P143131W	03/15/2002	Complete	BP America Production Co.	MON	019N	093W	19	SW1/4SE1/4	0	40.0	41.60320	-107.91815
P143132W	03/15/2002	Complete	BP America Production Co.	MON	019N	093W	19	NW1/4SE1/4	0	40.0	41.60682	-107.91819
P143133W	03/15/2002	Complete	BP America Production Co.	MON	019N	093W	19	SE1/4SE1/4	0	46.0	41.60313	-107.91335
P168348W	05/10/2005	--	BP America Production Co.	MIS	019N	093W	19	NE1/4SW1/4	150	--	41.60690	-107.92298
P57681W	07/24/1981	Complete	BP America Production Co.	STK	019N	093W	21	NE1/4NE1/4	25	7.0	41.61373	-107.87529
P100205W	09/05/1995	Complete	BP America Production Co.	STK	019N	093W	29	NE1/4SW1/4	25	300.0	41.59225	-107.90373
P100206W	09/05/1995	Complete	BP America Production Co.	STK	019N	093W	29	NE1/4SW1/4	25	340.0	41.59225	-107.90373
P65191W	06/24/1983	Complete	BP America Production Co.	STK	019N	093W	31	NE1/4SW1/4	10	520.0	41.57796	-107.92289
P169650W	07/13/2005	--	BP America Production Co.	MIS	019N	093W	33	SW1/4SW1/4	50	340.0	41.57413	-107.88923
P100203W	09/05/1995	Complete	BP America Production Co.	STK	019N	093W	35	SW1/4SW1/4	25	340.0	41.57388	-107.85067
P29066W	01/29/1975	Complete	BP America Production Co.	STK	019N	094W	5	NW1/4NW1/4	10	360.0	41.65729	-108.02358
P105068W	02/20/1997	Complete	BP America Production Co.	STK	019N	094W	13	SE1/4SW1/4	25	540.0	41.61793	-107.94199
P107541W	09/18/1997	Complete	BP America Production Co.	MON	019N	094W	13	NE1/4NW1/4	0	50.0	41.62878	-107.94197
P107542W	09/18/1997	Complete	BP America Production Co.	MON	019N	094W	13	NW1/4NW1/4	0	50.0	41.62880	-107.94683
P107543W	09/18/1997	Complete	BP America Production Co.	MON	019N	094W	13	NW1/4NW1/4	0	50.0	41.62880	-107.94683
P107544W	09/18/1997	Complete	BP America Production Co.	MON	019N	094W	13	NW1/4NW1/4	0	50.0	41.62880	-107.94683
P107545W	09/18/1997	Complete	BP America Production Co.	MON	019N	094W	13	NW1/4NW1/4	0	50.0	41.62880	-107.94683
P91787W	05/21/1993	--	BP America Production Co.	MON	019N	094W	14	SW1/4NE1/4	0	113.0	41.62512	-107.95644
P91788W	05/21/1993	--	BP America Production Co.	MON	019N	094W	14	NW1/4NE1/4	0	96.0	41.62873	-107.95643
P91789W	05/21/1993	--	BP America Production Co.	MON	019N	094W	14	NE1/4NE1/4	0	--	41.62878	-107.95164
P95594W	05/26/1994	Complete	BP America Production Co.	MON	019N	094W	14	NE1/4NE1/4	0	84.0	41.62878	-107.95164
P95595W	05/26/1994	Complete	BP America Production Co.	MON	019N	094W	14	NW1/4NE1/4	0	84.0	41.62873	-107.95643
P95596W	05/26/1994	Complete	BP America Production Co.	MON	019N	094W	14	NE1/4NE1/4	0	75.0	41.62878	-107.95164
P173453W	02/28/2006	--	BP America Production Co.	MIS	019N	094W	16	SE1/4SE1/4	100	--	41.61759	-107.99011
P54034W	10/06/1980	Complete	BP America Production Co.	STK	019N	094W	16	SW1/4NW1/4	2	6.0	41.62475	-108.00450
P54035W	10/06/1980	Complete	BP America Production Co.	STK	019N	094W	16	SW1/4SW1/4	1	6.0	41.61753	-108.00451
P98187W	01/10/1995	Complete	BP America Production Co.	STK	019N	094W	16	SW1/4NE1/4	25	1,000.0	41.62479	-107.99490
P34378W	05/12/1976	Complete	BP America Production Co.	STK	019N	094W	19	SE1/4NE1/4	10	500.0	41.61020	-108.02835
P173331W	03/02/2006	--	BP America Production Co.	MIS	019N	094W	23	SW1/4SW1/4	250	--	41.60321	-107.96597
P193315W	06/18/2010	Incomplete	BP America Production Co.	MIS	019N	094W	23	NW1/4SW1/4	50	300.0	41.60552	-107.96403
P71927W	02/03/1986	Complete	BP America Production Co.	STK	019N	094W	23	NW1/4SW1/4	10	340.0	41.60685	-107.96598
P188949W	09/19/2008	Fully Adjudicated	BP America Production Co.	MIS	019N	094W	31	SE1/4SW1/4	50	--	41.57355	-108.03809
P17496P	10/26/1967	Complete	BP America Production Co.	STK	019N	094W	34	SW1/4SW1/4	5	306.0	41.57424	-107.98515

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P26024W	02/27/1974	--	BP America Production Co.	DOM; IRR	019N	095W	1	NW1/4NW1/4	10	300.0	41.65726	-108.06221
P146658W	08/30/2002	Complete	BP America Production Co.	MON	019N	095W	4	SE1/4NW1/4	0	37.0	41.65344	-108.11499
P14942W	07/10/1972	Fully Adjudicated	BP America Production Co.	MIS	019N	095W	4	SW1/4NW1/4	9.5	210.0	41.65341	-108.11977
P110553W	06/15/1998	--	BP America Production Co.	DOM; STK	019N	095W	5	NE1/4NE1/4	25	--	41.65702	-108.12459
P146664W	08/30/2002	Complete	BP America Production Co.	MON	019N	095W	5	SE1/4NE1/4	0	57.0	41.65338	-108.12457
P6209W	07/29/1970	Complete	BP America Production Co.	DOM	019N	095W	5	SE1/4NE1/4	10	400.0	41.65338	-108.12457
P84281W	01/15/1991	Complete	BP America Production Co.	MON	019N	095W	5	SE1/4NE1/4	0	49.5	41.65338	-108.12457
P84282W	01/15/1991	Complete	BP America Production Co.	MON	019N	095W	5	SE1/4NE1/4	0	52.0	41.65338	-108.12457
P84283W	01/15/1991	Complete	BP America Production Co.	MON	019N	095W	5	SE1/4NE1/4	0	48.1	41.65338	-108.12457
P183453W	09/05/2007	Incomplete	BP America Production Co.	MIS	019N	095W	6	SE1/4SE1/4	25	--	41.64603	-108.14376
P183454W	09/05/2007	Incomplete	BP America Production Co.	MIS	019N	095W	6	SE1/4SE1/4	50	--	41.64603	-108.14376
P183455W	09/05/2007	Incomplete	BP America Production Co.	MIS	019N	095W	6	SE1/4SE1/4	75	--	41.64603	-108.14376
P38913W	06/28/1977	Complete	BP America Production Co.	DOM	019N	095W	6	SE1/4NW1/4	10	87.0	41.65322	-108.15347
P39016W	06/20/1977	Complete	BP America Production Co.	DOM	019N	095W	6	SW1/4SE1/4	12.1	120.0	41.64602	-108.14857
P43515W	05/24/1978	Complete	BP America Production Co.	DOM	019N	095W	6	SW1/4NW1/4	12	100.0	41.65320	-108.15869
P49641W	08/27/1979	Complete	BP America Production Co.	DOM	019N	095W	6	NE1/4SE1/4	20	100.0	41.64964	-108.14380
P51482W	03/11/1980	Complete	BP America Production Co.	DOM; STK	019N	095W	6	SW1/4NW1/4	20	875.0	41.65320	-108.15869
P65306W	08/16/1983	Complete	BP America Production Co.	DOM	019N	095W	6	NE1/4NW1/4	10	120.0	41.65684	-108.15352
P70476W	06/13/1985	Complete	BP America Production Co.	DOM	019N	095W	6	NE1/4NE1/4	25	135.0	41.65688	-108.14388
P189613W	01/07/2009	Complete	BP America Production Co.	MIS	019N	095W	11	SE1/4SW1/4	75	--	41.63139	-108.07661
P33378W	05/12/1976	Complete	BP America Production Co.	STK	019N	095W	11	NE1/4NE1/4	15	500.0	41.64275	-108.06718
P132358W	01/29/2001	--	BP America Production Co.	MIS	019N	095W	13	NE1/4SE1/4	0	--	41.62114	-108.04767
P173455W	02/28/2006	--	BP America Production Co.	MIS; STK	019N	095W	13	NE1/4SE1/4	100	1,160.0	41.62114	-108.04767
P152925W	08/07/2003	--	BP America Production Co.	MIS	019N	095W	21	NE1/4SW1/4	85	920.0	41.60652	-108.11480
P188948W	09/18/2008	Complete	BP America Production Co.	MIS	019N	095W	21	NE1/4SW1/4	150	--	41.60601	-108.11478
P17492W	12/20/1972	Complete	BP America Production Co.	STK	019N	095W	22	SE1/4NW1/4	5	445.0	41.61023	-108.09540
P17497P	10/26/1967	Complete	BP America Production Co.	STK	019N	095W	24	SE1/4SE1/4	5	300.0	41.60302	-108.04763
P168155W	06/08/2005	--	BP America Production Co.	DOM	019N	096W	1	NE1/4NW1/4	25	--	41.65683	-108.17359
P181365W	05/08/2007	--	BP America Production Co.	DOM	019N	096W	1	NW1/4SW1/4	25	--	41.64966	-108.17828
P56977W	06/02/1981	Complete	BP America Production Co.	DOM	019N	096W	1	SW1/4NW1/4	15	150.0	41.65327	-108.17833
P60980W	04/16/1982	Complete	BP America Production Co.	DOM	019N	096W	1	NW1/4NE1/4	10	148.0	41.65682	-108.16877
P34809W	08/19/1976	Complete	BP America Production Co.	DOM	019N	096W	2	NW1/4SE1/4	12	220.0	41.64966	-108.18782
P37180W	03/17/1977	--	BP America Production Co.	MIS	019N	096W	2	NW1/4SE1/4	20	300.0	41.64966	-108.18782
P59057W	09/24/1981	Complete	BP America Production Co.	STK	019N	096W	2	NE1/4NE1/4	25	500.0	41.65685	-108.18320
P80506W	08/17/1989	Complete	BP America Production Co.	DOM	019N	096W	2	NE1/4NE1/4	0	500.0	41.65685	-108.18320
P84603W	03/12/1991	Complete	BP America Production Co.	DOM; STK	019N	096W	2	NE1/4NE1/4	20	500.0	41.65685	-108.18320
P40865W	11/10/1977	Fully Adjudicated	BP America Production Co.	MIS	019N	096W	7	NW1/4NE1/4	5	400.0	41.64244	-108.26468
P66930W	04/09/1984	Fully Adjudicated	BP America Production Co.	MIS	019N	096W	7	NW1/4NE1/4	0	400.0	41.64244	-108.26468
P153420W	08/20/2003	Complete	BP America Production Co.	STK	019N	096W	13	SE1/4NW1/4	10	405.0	41.62432	-108.17332
P63763W	03/03/1983	Complete	BP America Production Co.	STK	019N	096W	15	NW1/4NW1/4	20	580.0	41.62803	-108.21641

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P32764W	04/02/1976	Complete	BP America Production Co.	STK	019N	096W	17	SW1/4NW1/4	3	500.0	41.62441	-108.25507
P9626W	07/01/1971	Complete	BP America Production Co.	DOM	019N	096W	18	NW1/4NE1/4	7	380.0	41.62800	-108.26474
P9627W	07/01/1971	Complete	BP America Production Co.	DOM	019N	096W	18	SE1/4NW1/4	8	455.0	41.62439	-108.26954
P50799W	12/19/1979	Complete	BP America Production Co.	STK	019N	096W	19	NE1/4SE1/4	3	300.0	41.60624	-108.25986
P189644W	01/15/2009	Incomplete	BP America Production Co.	MIS	019N	096W	20	SE1/4SE1/4	0		41.60208	-108.24060
P50385W	10/22/1979	Complete	BP America Production Co.	STK	019N	096W	21	NE1/4SE1/4	12	260.0	41.60631	-108.22127
P61410W	07/19/1982	Complete	BP America Production Co.	STK	019N	096W	23	SE1/4SW1/4	5	240.0	41.60269	-108.19239
P48828W	06/27/1979	Complete	BP America Production Co.	STK	019N	096W	31	NE1/4NE1/4	2	220.0	41.58453	-108.25985
P69128W	12/06/1984	Complete	BP America Production Co.	STK	019N	097W	1	NE1/4SW1/4	25	550.0	41.65064	-108.28468
P11767P	07/31/1964	Complete	BP America Production Co.	DOM; STK	019N	097W	3	NE1/4SE1/4	25	840.0	41.65068	-108.31368
P111931W	09/30/1998	Incomplete	BP America Production Co.	MIS	019N	097W	4	SW1/4SW1/4	60	1,060.0	41.64711	-108.34749
P11766P	07/31/1964	Complete	BP America Production Co.	DOM; STK	019N	097W	11	NW1/4SW1/4	25	900.0	41.63620	-108.30888
P50388W	10/22/1979	Complete	BP America Production Co.	STK	019N	097W	13	NE1/4SE1/4	5	420.0	--	--
P158802W	04/30/2004	Complete	BP America Production Co.	STK	019N	097W	14	NE1/4NW1/4	12	500.0	41.62862	-108.30409
P150183W	03/10/2003	Incomplete	BP America Production Co.	MIS	019N	097W	19	NW1/4SW1/4	80	540.0	41.60741	-108.38609
P194161W	10/13/2010	Incomplete	BP America Production Co.	IND	019N	097W	19	SE1/4SE1/4	80	--	41.60328	-108.37159
P194162W	10/13/2010	Incomplete	BP America Production Co.	IND	019N	097W	19	NW1/4SE1/4	85	--	41.60685	-108.37648
P194163W	10/13/2010	Incomplete	BP America Production Co.	IND	019N	097W	19	SE1/4NE1/4	80	--	41.61048	-108.37159
P50387W	10/22/1979	Complete	BP America Production Co.	STK	019N	097W	19	SW1/4NE1/4	10	200.0	41.61101	-108.37645
P9630W	07/01/1971	Complete	BP America Production Co.	DOM	019N	097W	19	NW1/4NW1/4	5	270.0	41.61466	-108.38608
P74518W	04/23/1987	Complete	BP America Production Co.	STK	019N	097W	21	SE1/4NE1/4	2	380.0	41.61091	-108.33303
P142883W	02/26/2002	Complete	BP America Production Co.	STK	019N	097W	25	NE1/4NE1/4	3	500.0	--	--
P163777W	11/17/2004	--	BP America Production Co.	MON	019N	098W	22	SE1/4NE1/4	0	45.5	41.61104	-108.42951
P148445W	12/11/2002	Complete	BP America Production Co.	MON	019N	098W	23	SW1/4NW1/4	0	25.0	41.61104	-108.42469
P148446W	12/11/2002	Complete	BP America Production Co.	MON	019N	098W	23	SW1/4NE1/4	0	35.0	41.61104	-108.41504
P148447W	12/11/2002	Complete	BP America Production Co.	MON	019N	098W	23	NW1/4SE1/4	0	35.0	41.60742	-108.41504
P148448W	12/11/2002	Complete	BP America Production Co.	MON	019N	098W	23	NE1/4SW1/4	0	27.0	41.60742	-108.41986
P148449W	12/11/2002	Complete	BP America Production Co.	MON	019N	098W	23	SE1/4NW1/4	0	35.0	41.61104	-108.41986
P163770W	11/17/2004	--	BP America Production Co.	MON	019N	098W	23	SW1/4NE1/4	0	49.5	41.61104	-108.41504
P163771W	11/17/2004	--	BP America Production Co.	MON	019N	098W	23	NE1/4NE1/4	0	64.5	41.61466	-108.41021
P163772W	11/17/2004	--	BP America Production Co.	MON	019N	098W	23	NW1/4NE1/4	0	48.5	41.61466	-108.41504
P163773W	11/17/2004	--	BP America Production Co.	MON	019N	098W	23	SE1/4NW1/4	0	49.0	41.61104	-108.41986
P163774W	11/17/2004	--	BP America Production Co.	MON	019N	098W	23	NE1/4NW1/4	0	38.4	41.61466	-108.41986
P163775W	11/17/2004	--	BP America Production Co.	MON	019N	098W	23	NW1/4NE1/4	0	43.5	41.61466	-108.41504
P163776W	11/17/2004	--	BP America Production Co.	MON	019N	098W	23	SW1/4NE1/4	0	49.5	41.61104	-108.41504
P169635W	09/06/2005	Unadjudicated	BP America Production Co.	MIS; MIS; MIS	019N	098W	23	SE1/4NW1/4	60	620.0	41.61059	-108.41986
P34816W	08/23/1976	Fully Adjudicated	BP America Production Co.	IND; MIS	019N	098W	23	SW1/4NE1/4	50	601.0	41.61104	-108.41504
P37252W	03/31/1977	Fully Adjudicated	BP America Production Co.	MIS	019N	098W	23	NW1/4SE1/4	30	603.0	41.60742	-108.41504
P52803W	06/25/1980	Fully Adjudicated	BP America Production Co.	IND	019N	098W	23	SW1/4NE1/4	50	610.0	41.61104	-108.41504
P59378W	01/04/1982	Fully Adjudicated	BP America Production Co.	IND	019N	098W	23	SW1/4NE1/4	55	634.0	41.61104	-108.41504

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P64759W	04/01/1983		BP America Production Co.	MIS	019N	098W	23	SW1/4NE1/4	0	601.0	41.61104	-108.41504
P64760W	04/01/1983	Fully Adjudicated	BP America Production Co.	MIS	019N	098W	23	NW1/4SE1/4	0	603.0	41.60742	-108.41504
P64762W	04/01/1983	Fully Adjudicated	BP America Production Co.	MIS	019N	098W	23	SW1/4NE1/4	0	610.0	41.61104	-108.41504
P64763W	04/01/1983	Fully Adjudicated	BP America Production Co.	MIS	019N	098W	23	SW1/4NE1/4	0	634.0	41.61104	-108.41504
CR UW04/206	08/23/1976	--	BP America Production Co.	IND	019N	098W	23	SW1/4NE1/4	50	--	41.61104	-108.41504
CR UW04/207	03/31/1977	--	BP America Production Co.	IND	019N	098W	23	NW1/4SE1/4	30	--	41.60742	-108.41504
CR UW04/208	08/23/1976	--	BP America Production Co.	IND	019N	098W	23	NE1/4SW1/4	50	--	41.60742	-108.41986
CR UW04/212	06/25/1980	--	BP America Production Co.	IND	019N	098W	23	SW1/4NE1/4	50	--	41.61104	-108.41504
CR UW05/141	01/04/1982	--	BP America Production Co.	IND	019N	098W	23	SW1/4NE1/4	55	--	41.61104	-108.41504
P74517W	04/23/1987	Complete	BP America Production Co.	STK	019N	098W	33	NW1/4NW1/4	5	340.0	41.58574	-108.46324
P38641W	07/05/1977	Complete	BP America Production Co.	STK	019N	098W	35	NW1/4NE1/4	10	350.0	41.58569	-108.41504
P108008W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	32.0	41.59304	-108.51101
P108009W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P108010W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	28.0	41.59304	-108.51101
P108011W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P108012W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	21.0	41.59304	-108.51101
P108013W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NE1/4SE1/4	0	36.0	41.59303	-108.50619
P108014W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NE1/4SE1/4	0	35.0	41.59303	-108.50619
P108015W	11/03/1997	Complete	BP America Production Co.	MON	019N	099W	25	NE1/4SE1/4	0	62.0	41.59303	-108.50619
P113569W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	30.0	41.58942	-108.51102
P113570W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	50.0	41.58942	-108.51102
P113571W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	28.0	41.58942	-108.51102
P113572W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	40.0	41.58942	-108.51102
P113573W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	45.0	41.58942	-108.51102
P113574W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	30.0	41.58942	-108.51102
P113575W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	30.0	41.58942	-108.51102
P113576W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	25.0	41.58942	-108.51102
P113577W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	55.0	41.58942	-108.51102
P113578W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	31.0	41.58942	-108.51102
P113579W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	20.0	41.58942	-108.51102
P113580W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	28.0	41.58942	-108.51102
P113589W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	50.0	41.58942	-108.51102
P113590W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	27.5	41.58942	-108.51102
P113592W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	40.0	41.58942	-108.51102
P113596W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	30.0	41.58942	-108.51102
P113597W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	20.0	41.58942	-108.51102
P113598W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	30.0	41.58942	-108.51102
P113599W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	35.0	41.58942	-108.51102
P113600W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	33.0	41.58942	-108.51102
P113601W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	50.0	41.58942	-108.51102

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P113603W	01/20/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	50.0	41.58942	-108.51102
P116942W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	22.0	41.58942	-108.51102
P116943W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	22.0	41.58942	-108.51102
P116944W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	23.0	41.58942	-108.51102
P116945W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	23.0	41.58942	-108.51102
P116946W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	23.0	41.58942	-108.51102
P116947W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	23.0	41.58942	-108.51102
P116948W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	23.0	41.58942	-108.51102
P116949W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	28.5	41.58942	-108.51102
P116950W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	20.0	41.59304	-108.51101
P116951W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	23.0	41.58942	-108.51102
P116952W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	30.0	41.58942	-108.51102
P116953W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	35.0	41.58942	-108.51102
P116954W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	30.0	41.58942	-108.51102
P116955W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	31.0	41.58942	-108.51102
P116956W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	27.0	41.58942	-108.51102
P116957W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	21.0	41.58942	-108.51102
P116958W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	22.0	41.58942	-108.51102
P116959W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	20.0	41.58942	-108.51102
P116960W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	26.5	41.58942	-108.51102
P116961W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NE1/4SE1/4	0	25.0	41.59303	-108.50619
P116962W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NE1/4SE1/4	0	26.0	41.59303	-108.50619
P116963W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P116964W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	55.0	41.59304	-108.51101
P116965W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	21.0	41.59304	-108.51101
P116966W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P116968W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P116969W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P116970W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P116971W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4NE1/4	0	30.0	41.59666	-108.51101
P116972W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4NE1/4	0	81.0	41.59665	-108.50619
P116973W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	31.0	41.59304	-108.51101
P116974W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	30.0	41.59304	-108.51101
P116975W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	45.0	41.58942	-108.51102
P116976W	07/06/1999	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	55.0	41.58942	-108.51102
P126180W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	25.0	41.58941	-108.50620
P126181W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	40.0	41.58942	-108.51102
P126182W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	45.0	41.58941	-108.50620
P126183W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	46.0	41.58942	-108.51102
P126184W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	22.0	41.58941	-108.50620

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P126185W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	26.0	41.58941	-108.50620
P126186W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	40.0	41.58941	-108.50620
P126187W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	30.0	41.58941	-108.50620
P126188W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	NE1/4SE1/4	0	48.0	41.59303	-108.50619
P126189W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SE1/4	0	48.0	41.58942	-108.51102
P126190W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	52.0	41.58941	-108.50620
P126191W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	60.0	41.58941	-108.50620
P126192W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	65.0	41.58941	-108.50620
P126193W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	57.0	41.58941	-108.50620
P126194W	06/09/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	32.0	41.58941	-108.50620
P127532W	08/03/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	26.0	41.58941	-108.50620
P128402W	08/21/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	51.0	41.58941	-108.50620
P128403W	08/21/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	51.0	41.58941	-108.50620
P128404W	08/21/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	39.0	41.58941	-108.50620
P128405W	08/21/2000	Complete	BP America Production Co.	MON	019N	099W	25	SE1/4SE1/4	0	37.0	41.58941	-108.50620
P138366W	08/22/2001	Complete	BP America Production Co.	MON	019N	099W	25	SW1/4SW1/4	0	22.7	41.58943	-108.52066
P160772W	06/21/2004	--	BP America Production Co.	IND; MIS	019N	099W	25	SW1/4SE1/4	50	--	41.58942	-108.51102
P86107W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	56.0	41.59304	-108.51101
P86109W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	60.0	41.59304	-108.51101
P86110W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	50.0	41.59304	-108.51101
P86111W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	50.0	41.59304	-108.51101
P86112W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	60.0	41.59304	-108.51101
P86113W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	50.0	41.59304	-108.51101
P86114W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	60.0	41.59304	-108.51101
P86115W	09/12/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	57.6	41.59304	-108.51101
P86703W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	60.0	41.59304	-108.51101
P86704W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	60.0	41.59304	-108.51101
P86705W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	46.0	41.59304	-108.51101
P86706W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	19.0	41.59304	-108.51101
P86707W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	40.0	41.59304	-108.51101
P86708W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	59.0	41.59304	-108.51101
P86709W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	31.0	41.59304	-108.51101
P86710W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	35.0	41.59304	-108.51101
P86711W	12/05/1991	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	57.0	41.59304	-108.51101
P95232W	04/20/1994	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	58.0	41.59304	-108.51101
P95233W	04/20/1994	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	78.0	41.59304	-108.51101
P95234W	04/20/1994	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	44.0	41.59304	-108.51101
P95235W	04/20/1994	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	66.0	41.59304	-108.51101
P95307W	05/02/1994	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	31.5	41.59304	-108.51101
P95308W	05/02/1994	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	58.0	41.59304	-108.51101

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P95309W	05/02/1994	Complete	BP America Production Co.	MON	019N	099W	25	NW1/4SE1/4	0	39.0	41.59304	-108.51101
P129945W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	21.0	41.58579	-108.51102
P129946W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	21.0	41.58579	-108.51102
P129947W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	40.0	41.58579	-108.51102
P129948W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	21.0	41.58579	-108.51102
P129949W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	20.0	41.58579	-108.51102
P129950W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	20.0	41.58579	-108.51102
P129951W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	21.0	41.58579	-108.51102
P129952W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	30.0	41.58579	-108.51102
P129953W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	45.0	41.58579	-108.51102
P129954W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	20.0	41.58579	-108.51102
P129955W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	21.0	41.58579	-108.51102
P129956W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	29.0	41.58579	-108.51102
P129957W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	93.0	41.58579	-108.51102
P129958W	10/12/2000	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	48.0	41.58579	-108.51102
P138367W	08/22/2001	Complete	BP America Production Co.	MON	019N	099W	36	SW1/4NE1/4	0	24.4	41.58217	-108.51102
P138368W	08/22/2001	Complete	BP America Production Co.	MON	019N	099W	36	NW1/4NE1/4	0	16.3	41.58579	-108.51102
P146198W	07/30/2002	Complete	BP America Production Co.	MON	019N	099W	36	NE1/4NW1/4	0	27.3	41.58580	-108.51584
P146199W	07/30/2002	Complete	BP America Production Co.	MON	019N	099W	36	SE1/4NE1/4	0	25.3	41.58217	-108.50620
P146200W	07/30/2002	Complete	BP America Production Co.	MON	019N	099W	36	SE1/4NW1/4	0	25.3	41.58218	-108.51584
P39826W	07/15/1977	Complete	BP America Production Co.	STK	020N	090W	31	SW1/4NW1/4	5	150.0	41.66637	-107.58390
P17376P	06/30/1966	Complete	BP America Production Co.	STK	020N	090W	34	NW1/4NE1/4	5	300.0	41.66994	-107.51686
P39827W	07/15/1977	Complete	BP America Production Co.	STK	020N	090W	34	SW1/4NE1/4	5	260.0	41.66633	-107.51683
P6414P	05/31/1963	Complete	BP America Production Co.	DOM; STK	020N	091W	18	NE1/4SW1/4	7.5	180.0	41.70701	-107.69469
P99499W	06/09/1995	Complete	BP America Production Co.	STK	020N	091W	18	SW1/4SW1/4	20	237.0	41.70350	-107.69893
P111868W	09/21/1998	Complete	BP America Production Co.	STK	020N	091W	19	SE1/4NE1/4	4	190.0	41.69614	-107.68502
P53645W	09/02/1980	Complete	BP America Production Co.	MON	020N	091W	19	SE1/4NW1/4	0	50.0	41.69624	-107.69464
P6412P	05/31/1963	Complete	BP America Production Co.	STK	020N	091W	21	NW1/4SE1/4	7.5	240.0	41.69236	-107.65142
P111869W	09/21/1998	Complete	BP America Production Co.	STK	020N	091W	23	NW1/4SE1/4	4	280.0	41.69188	-107.61301
P6420P	05/31/1963	Complete	BP America Production Co.	STK	020N	091W	33	NE1/4NW1/4	7.5	105.0	41.67067	-107.65615
P6413P	05/31/1962	Complete	BP America Production Co.	STK	020N	091W	35	SW1/4NE1/4	7.5	270.0	41.66663	-107.61281
P142885W	02/26/2002	--	BP America Production Co.	STK	020N	092W	1	SW1/4NW1/4	25	220.0	41.73930	-107.71773
P129280W	09/25/2000	Complete	BP America Production Co.	STK	020N	092W	7	NW1/4NE1/4	25	500.0	41.72892	-107.80424
P14185W	06/01/1972	--	BP America Production Co.	MIS	020N	092W	11	SW1/4NW1/4	25	--	41.72535	-107.73693
P82127W	04/09/1990	Incomplete	BP America Production Co.	MIS	020N	092W	11	SW1/4NE1/4	15	240.0	41.72528	-107.72734
P38499W	06/30/1977	Fully Adjudicated	BP America Production Co.	MIS	020N	092W	15	SW1/4SW1/4	5	265.0	41.70365	-107.75622
P40245W	08/30/1977	Fully Adjudicated	BP America Production Co.	MIS	020N	092W	15	SW1/4SW1/4	5	265.0	41.70365	-107.75622
P50797W	12/19/1979	Complete	BP America Production Co.	STK	020N	092W	19	NE1/4NE1/4	10	--	41.70001	-107.79934
P183655W	10/25/2007	--	BP America Production Co.	MIS	020N	092W	20	NW1/4NW1/4	100	--	41.70000	-107.79453
P53634W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	25	NW1/4SW1/4	0	90.0	41.67825	-107.71764



# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P53680W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	25	NW1/4SW1/4	0	140.0	41.67825	-107.71764
P53693W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	25	NW1/4SW1/4	0	230.0	41.67825	-107.71764
P53698W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	25	NW1/4SW1/4	0	86.0	41.67825	-107.71764
P53699W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	25	NW1/4SW1/4	0	170.0	41.67825	-107.71764
P53638W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	27	SE1/4SE1/4	0	378.0	41.67465	-107.74161
P53689W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	27	SE1/4SE1/4	0	130.0	41.67465	-107.74161
P53690W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	27	SE1/4SE1/4	0	158.0	41.67465	-107.74161
P53691W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	27	SE1/4SE1/4	0	302.0	41.67465	-107.74161
P53695W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	27	SE1/4SE1/4	0	464.0	41.67465	-107.74161
P53669W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	33	SE1/4SE1/4	0	232.0	41.66023	-107.76081
P53671W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	33	SE1/4SE1/4	0	87.0	41.66023	-107.76081
P53648W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	35	SW1/4SE1/4	0	145.0	41.66021	-107.72707
P53688W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	35	SW1/4SE1/4	0	203.0	41.66021	-107.72707
P53692W	09/02/1980	Complete	BP America Production Co.	MON	020N	092W	35	SW1/4SE1/4	0	95.0	41.66021	-107.72707
P191918W	12/04/2009	Incomplete	BP America Production Co.	MON	020N	093W	1	SE1/4NE1/4	0	--	41.73861	-107.81998
P96912W	09/01/1994	--	BP America Production Co.	MIS	020N	093W	4	SW1/4SW1/4	--	--	41.73280	-107.88999
P193634W	05/28/2010	Complete	BP America Production Co.	STK	020N	093W	5	SE1/4SW1/4	10	685.0	41.73453	-107.90623
P63761W	03/03/1983	Complete	BP America Production Co.	STK	020N	093W	13	NW1/4SW1/4	10	620.0	41.70725	-107.83191
P170571W	10/04/2005	--	BP America Production Co.	MIS	020N	093W	20	SE1/4NE1/4	150	--	41.69689	-107.89452
P18226P	09/15/1965	Complete	BP America Production Co.	STK	020N	093W	20	NW1/4NW1/4	15	-1.0	41.70060	-107.90911
P194472W	12/02/2010	Complete	BP America Production Co.	MIS	020N	093W	21	SE1/4SW1/4	50	660.0	41.69121	-107.88686
P50389W	10/22/1979	Complete	BP America Production Co.	STK	020N	093W	23	SE1/4NE1/4	2	250.0	41.69645	-107.83653
P178317W	09/07/2006	Complete	BP America Production Co.	MIS	020N	093W	25	SE1/4SW1/4	50	640.0	41.67479	-107.82703
P192145W	02/04/2010	Complete	BP America Production Co.	MIS	020N	093W	25	SE1/4SW1/4	50	640.0	41.67645	-107.82867
P152042W	06/05/2003	--	BP America Production Co.	MIS	020N	093W	27	SW1/4SW1/4	200	--	41.67519	-107.87026
P50798W	12/19/1979	Complete	BP America Production Co.	STK	020N	093W	29	NE1/4SE1/4	5	300.0	41.67894	-107.89399
P183319W	07/18/2007	--	BP America Production Co.	STK	020N	093W	31	NE1/4SW1/4	25	--	41.66492	-107.92337
P50390W	10/22/1979	Complete	BP America Production Co.	STK	020N	093W	35	NE1/4NE1/4	15	350.0	41.67126	-107.83666
P139579W	07/03/2001	--	BP America Production Co.	MIS	020N	094W	7	SW1/4NE1/4	0	700.0	41.72605	-108.03318
P164756W	01/25/2005	Complete	BP America Production Co.	MIS	020N	094W	7	SW1/4NE1/4	50	700.0	41.72609	-108.03309
P94775W	03/24/1994	Incomplete	BP America Production Co.	MIS; STK	020N	094W	7	SE1/4SE1/4	60	10,021.0	41.71887	-108.02835
P14750W	07/21/1972	Complete	BP America Production Co.	STK	020N	094W	8	NW1/4SW1/4	10	300.0	41.72252	-108.02354
P184333W	12/17/2007	Incomplete	BP America Production Co.	MIS	020N	094W	9	NW1/4SE1/4	50	--	41.72291	-107.99400
P59219W	01/05/1982	Complete	BP America Production Co.	STK	020N	094W	9	NW1/4SE1/4	15	740.0	41.72262	-107.99482
P29065W	01/29/1975	Complete	BP America Production Co.	STK	020N	094W	11	SW1/4SE1/4	10	500.0	41.71905	-107.95634
P263W	11/12/1959	Complete	BP America Production Co.	STK	020N	094W	15	SE1/4SE1/4	28	810.0	41.70461	-107.97081
P193303W	06/23/2010	Complete	BP America Production Co.	MIS	020N	094W	17	SE1/4NE1/4	50	800.0	41.71352	-108.01101
P7544P	12/31/1929	Complete	BP America Production Co.	STK	020N	094W	19	NW1/4SE1/4	15	100.0	41.69344	-108.03321
P189036W	10/07/2008	Fully Adjudicated	BP America Production Co.	MIS	020N	094W	20	SE1/4NW1/4	50	-	41.69672	-108.01887
P102711W	05/16/1996	Complete	BP America Production Co.	STK	020N	094W	22	NW1/4SW1/4	15	400.0	41.69373	-107.98537

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P113188W	11/25/1998	Complete	BP America Production Co.	MUN	020N	094W	22	SE1/4SW1/4	250	--	41.69014	-107.98053
P186502W	04/21/2008	Incomplete	BP America Production Co.	TST	020N	094W	22	NE1/4SW1/4	0	--	41.69328	-107.98050
P192719W	10/21/2009	Incomplete	BP America Production Co.	MUN	020N	094W	22	NE1/4SW1/4	400	--	41.69373	-107.98048
P7545P	03/23/1963	Complete	BP America Production Co.	STK	020N	094W	22	NW1/4SW1/4	10	240.0	41.69373	-107.98537
P35724W	12/17/1976	Complete	BP America Production Co.	STK	020N	094W	24	NW1/4SW1/4	6	500.0	41.69382	-107.94668
P132296W	01/19/2001	--	BP America Production Co.	MON	020N	094W	27	SE1/4SW1/4	0	-1.0	41.67557	-107.98054
P146655W	08/30/2002	Complete	BP America Production Co.	MON	020N	094W	27	SW1/4SE1/4	0	78.0	41.67559	-107.97569
P146657W	08/30/2002	Complete	BP America Production Co.	MON	020N	094W	27	NW1/4SW1/4	0	66.0	41.67919	-107.98538
P189429W	11/13/2008	Incomplete	BP America Production Co.	MIS	020N	094W	27	NE1/4NE1/4	75	--	41.68610	-107.97085
P192718W	10/02/2009	Incomplete	BP America Production Co.	MUN	020N	094W	27	NE1/4NE1/4	200	--	41.68604	-107.97095
P15644W	08/28/1972	Complete	BP America Production Co.	STK	020N	094W	30	SW1/4SE1/4	10	400.0	41.67538	-108.03312
P181641W	06/07/2007	Unadjudicated	BP America Production Co.	MIS	020N	094W	32	SW1/4NW1/4	40	--	41.66944	-108.02279
P59218W	01/05/1982	Complete	BP America Production Co.	STK	020N	094W	33	SE1/4NW1/4	12	360.0	41.66832	-107.99965
P117C	12/31/1898	Incomplete	BP America Production Co.	--	020N	094W	34	NE1/4NE1/4	20	1,590.0	41.67200	-107.97086
P118C	05/04/1902	Incomplete	BP America Production Co.	MUN	020N	094W	34	SW1/4NE1/4	10	1,365.0	41.66837	-107.97568
P119C	01/15/1912	Incomplete	BP America Production Co.	MUN	020N	094W	34	NW1/4NE1/4	15	1,905.0	41.67197	-107.97569
P120C	08/20/1921	Incomplete	BP America Production Co.	MUN	020N	094W	34	NW1/4NE1/4	67	1,801.0	41.67197	-107.97569
P132295W	01/19/2001	--	BP America Production Co.	MON	020N	094W	34	NE1/4NW1/4	0	-1.0	41.67194	-107.98052
P132297W	01/19/2001	--	BP America Production Co.	MON	020N	094W	34	NE1/4NW1/4	0	-1.0	41.67194	-107.98052
P146654W	08/30/2002	Complete	BP America Production Co.	MON	020N	094W	34	NE1/4NW1/4	0	81.0	41.67194	-107.98052
P150263W	04/02/2003	--	BP America Production Co.	MIS	020N	094W	34	NE1/4NE1/4	100		41.67200	-107.97086
P17024P	10/24/1958	Complete	BP America Production Co.	DOM	020N	094W	34	NE1/4NW1/4	20	1,045.0	41.67194	-107.98052
P177859W	09/19/2006	Complete	BP America Production Co.	MIS; STK	020N	094W	34	NW1/4SE1/4	80	1,020.0	41.66477	-107.97566
P41724W	02/06/1978	Fully Adjudicated	BP America Production Co.	MIS	020N	094W	34	NE1/4SE1/4	100	1,040.0	41.66479	-107.97085
P47788W	05/02/1979	--	BP America Production Co.	MIS	020N	094W	34	SE1/4SE1/4	50	1,020.0	41.66119	-107.97085
P48097W	05/02/1979	Incomplete	BP America Production Co.	MIS	020N	094W	34	NE1/4SE1/4	46	1,020.0	41.66479	-107.97085
P49765W	08/13/1979	Incomplete	BP America Production Co.	MIS	020N	094W	34	SE1/4SE1/4	20	1,040.0	41.66119	-107.97085
P52858W	07/01/1980	Fully Adjudicated	BP America Production Co.	DOM; MIS	020N	094W	34	SE1/4SE1/4	10	660.0	41.66119	-107.97085
P56206W	06/08/1979		BP America Production Co.	DOM; MIS	020N	094W	34	SE1/4SE1/4	60	1,035.0	41.66119	-107.97085
P60649W	11/30/1981	Fully Adjudicated	BP America Production Co.	MIS	020N	094W	34	SW1/4SE1/4	150	1,100.0	41.66117	-107.97565
P695W	03/28/1961	--	BP America Production Co.	DOM; IND; IRR; MIS	020N	094W	34	NW1/4NW1/4	250	1,046.0	41.67192	-107.98536
P70302W	02/28/1985	--	BP America Production Co.	DOM; MIS	020N	094W	34	NE1/4SE1/4	25	1,180.0	41.66479	-107.97085
P84596W	06/29/1988	Incomplete	BP America Production Co.	MIS	020N	094W	34	NE1/4SE1/4	150	1,000.0	41.66479	-107.97085
P86244W	03/11/1991	Incomplete	BP America Production Co.	MIS	020N	094W	34	NE1/4SE1/4	25	1,180.0	41.66479	-107.97085
P97699W	11/03/1994	Complete	BP America Production Co.	MON	020N	094W	34	SE1/4SE1/4	0	25.0	41.66119	-107.97085
P97700W	11/03/1994	Complete	BP America Production Co.	MON	020N	094W	34	SE1/4SE1/4	0	25.0	41.66119	-107.97085
P97701W	11/03/1994	Complete	BP America Production Co.	MON	020N	094W	34	SE1/4SE1/4	0	25.0	41.66119	-107.97085
P97702W	11/03/1994	Complete	BP America Production Co.	MON	020N	094W	34	SE1/4SE1/4	0	25.0	41.66119	-107.97085
P97703W	11/03/1994	Complete	BP America Production Co.	MON	020N	094W	34	SE1/4SE1/4	0	30.0	41.66119	-107.97085
CR UW04/213	07/01/1980	--	BP America Production Co.	DOM; MIS	020N	094W	34	SE1/4SE1/4	10	--	41.66119	-107.97085

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P173330W	03/02/2006	--	BP America Production Co.	MIS	020N	094W	35	NW1/4NW1/4	150	--	41.67201	-107.96603
P188087W	07/30/2008	Incomplete	BP America Production Co.	MIS; MIS	020N	094W	35	SE1/4NW1/4	175	--	41.66886	-107.96122
P189201W	10/15/2008	Incomplete	BP America Production Co.	MIS	020N	095W	7	SW1/4NE1/4	50	700.0	41.72443	-108.14947
P55030W	11/26/1980	--	BP America Production Co.	DOM	020N	095W	7	SW1/4NE1/4	25	140.0	41.72558	-108.14890
P144149W	04/23/2002	Complete	BP America Production Co.	DOM; STK	020N	095W	8	NW1/4SE1/4	14	210.0	41.72218	-108.12953
P144331W	05/06/2002	Complete	BP America Production Co.	DOM; STK	020N	095W	8	NE1/4SE1/4	14	210.0	41.72220	-108.12469
P189347W	10/31/2008	Incomplete	BP America Production Co.	DOM; STK	020N	095W	8	NW1/4NE1/4	25	--	41.72919	-108.12957
P42533W	03/20/1978	Complete	BP America Production Co.	DOM; STK	020N	095W	8	NE1/4NE1/4	5	300.0	41.72945	-108.12468
P26025W	02/27/1974	Complete	BP America Production Co.	STK	020N	095W	11	SW1/4SW1/4	10	610.0	41.71875	-108.08135
P193949W	08/04/2010	Complete	BP America Production Co.	STK	020N	095W	13	NW1/4SE1/4	9	9,692.0	41.70758	-108.05172
P106869W	07/16/1997	Incomplete	BP America Production Co.	MIS	020N	095W	16	SE1/4SE1/4	25	575.0	41.70421	-108.10536
P193882W	09/10/2010	Incomplete	BP America Production Co.	DOM; STK	020N	095W	17	NW1/4NW1/4	25	--	41.71444	-108.13923
P33697W	06/01/1976	Complete	BP America Production Co.	DOM; STK	020N	095W	17	NE1/4NW1/4	35	150.0	41.71490	-108.13437
P69555W	01/07/1985	Complete	BP America Production Co.	DOM; STK	020N	095W	17	SE1/4SW1/4	25	180.0	41.70401	-108.13437
P7831W	01/26/1971	Complete	BP America Production Co.	STK	020N	095W	18	NE1/4SW1/4	25	9,337.0	41.70738	-108.15372
P62636W	12/01/1982	Complete	BP America Production Co.	DOM	020N	095W	19	NW1/4SW1/4	10	150.0	41.69286	-108.15899
P43000W	04/28/1978	Incomplete	BP America Production Co.	DOM; MIS; STK	020N	095W	20	SW1/4NW1/4	8	80.0	41.69674	-108.13919
P44604W	08/10/1978	Complete	BP America Production Co.	DOM	020N	095W	20	SE1/4NW1/4	12	141.0	41.69677	-108.13436
P99764W	07/21/1995	Complete	BP America Production Co.	DOM	020N	095W	20	NW1/4NW1/4	8	120.0	41.70036	-108.13920
P102712W	05/16/1996	Complete	BP America Production Co.	STK	020N	095W	21	NW1/4SE1/4	15	665.0	41.69332	-108.11016
P9963W	08/04/1971	Complete	BP America Production Co.	STK	020N	095W	21	NE1/4SE1/4	20	280.0	41.69336	-108.10532
P102804W	06/21/1996	Complete	BP America Production Co.	STK	020N	095W	23	NW1/4SE1/4	20	760.0	41.69344	-108.07174
P59220W	01/05/1982	Complete	BP America Production Co.	STK	020N	095W	27	NE1/4SE1/4	15	780.0	41.67892	-108.08619
P7543P	12/31/1929	Complete	BP America Production Co.	STK	020N	095W	33	SW1/4SW1/4	15	380.0	41.66068	-108.11982
P15643W	08/28/1972	Complete	BP America Production Co.	STK	020N	095W	35	SW1/4NE1/4	10	400.0	41.66809	-108.07177
P22968W	12/07/1972	Complete	BP America Production Co.	STK	020N	096W	10	SW1/4NW1/4	25	2,850.0	41.72549	-108.21708
P178351W	10/30/2006	--	BP America Production Co.	MIS	020N	096W	12	NE1/4SW1/4	100	--	41.72175	-108.17406
P49642W	08/27/1979	Complete	BP America Production Co.	STK	020N	096W	13	SW1/4NE1/4	25	160.0	41.71088	-108.16919
P62810W	12/21/1982	Complete	BP America Production Co.	DOM	020N	096W	24	NW1/4SW1/4	10	280.0	41.69296	-108.17854
P63378W	03/08/1983	Complete	BP America Production Co.	DOM	020N	096W	24	NE1/4NW1/4	10	167.0	41.70010	-108.17385
P49643W	08/27/1979	Complete	BP America Production Co.	STK	020N	096W	25	NW1/4NE1/4	25	260.0	41.68569	-108.16893
P49644W	08/27/1979	Complete	BP America Production Co.	DOM	020N	096W	26	SW1/4NW1/4	25	750.0	41.68217	-108.19784
P60892W	05/20/1982	Complete	BP America Production Co.	DOM	020N	096W	26	NW1/4NW1/4	10	350.0	41.68580	-108.19782
P63520W	03/01/1983	Complete	BP America Production Co.	DOM	020N	096W	26	NW1/4SE1/4	7	290.0	41.67854	-108.18816
P187202W	06/25/2008	Incomplete	BP America Production Co.	STK	020N	096W	35	NE1/4NW1/4	25	--	41.67074	-108.19289
P187203W	06/25/2008	Incomplete	BP America Production Co.	DOM	020N	096W	35	SE1/4SW1/4	25	--	41.65979	-108.19300
P34057W	06/09/1976	Complete	BP America Production Co.	DOM	020N	096W	36	SE1/4NW1/4	20	120.0	41.66765	-108.17365
P57110W	06/02/1981	Complete	BP America Production Co.	DOM; STK	020N	096W	36	SE1/4NW1/4	20	138.0	41.66765	-108.17365
P64300W	06/07/1983	Complete	BP America Production Co.	DOM	020N	096W	36	NE1/4NW1/4	18	170.0	41.67126	-108.17366
P82536W	05/24/1990	Complete	BP America Production Co.	STK	020N	096W	36	NW1/4SE1/4	7	196.0	41.66403	-108.16882

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P42290W	10/26/1977	Fully Adjudicated	BP America Production Co.	DOM; IRR; STK	020N	097W	1	NW1/4SW1/4	400	1,600.0	41.73761	-108.28948
CR UW06/107	10/26/1977	--	BP America Production Co.	DOM; IRR; STK	020N	097W	1	NW1/4SW1/4	400	--	41.73761	-108.28948
P158801W	04/30/2004	Complete	BP America Production Co.	STK	020N	097W	15	NW1/4SE1/4	6	490.0	41.70837	-108.31838
P104358W	10/21/1996	Incomplete	BP America Production Co.	MIS	020N	097W	27	NW1/4NE1/4	60	800.0	41.68694	-108.31848
P189038W	10/07/2008	Fully Adjudicated	BP America Production Co.	MIS	020N	097W	36	NE1/4SW1/4	120	--	41.66461	-108.28462
P148709W	12/26/2002	--	BP America Production Co.	DOM; STK	021N	091W	9	SE1/4NW1/4	25	--	41.80774	-107.69169
P173344W	02/27/2006	--	BP America Production Co.	STK	021N	091W	18	SE1/4NE1/4	25	--	41.79324	-107.72066
P38929W	06/22/1977	--	BP America Production Co.	MIS	021N	091W	21	SE1/4SW1/4	0	460.0	41.77146	-107.69161
P108972W	03/02/1998	Complete	BP America Production Co.	DOM	021N	091W	26	NW1/4NW1/4	25	350.0	41.76778	-107.65777
P27102W	06/26/1974	Complete	BP America Production Co.	STK	021N	091W	30	NE1/4NE1/4	10	1,002.0	41.76788	-107.72069
P164449W	12/14/2004	--	BP America Production Co.	DOM; STK	021N	091W	34	NW1/4SW1/4	25	--	41.74610	-107.67724
P35939W	01/19/1977	Complete	BP America Production Co.	STK	021N	092W	1	SE1/4SW1/4	5	240.0	41.81503	-107.74952
P56414W	04/10/1981	Complete	BP America Production Co.	STK	021N	092W	1	SE1/4SW1/4	10	650.0	41.81503	-107.74952
P177392W	09/15/2006	--	BP America Production Co.	MIS	021N	092W	8	SE1/4SW1/4	200	--	41.80064	-107.82701
P140257W	10/18/2001	Complete	BP America Production Co.	STK	021N	092W	9	SW1/4SW1/4	9	803.0	41.80061	-107.81250
P142884W	02/26/2002	Complete	BP America Production Co.	STK	021N	092W	11	SE1/4SE1/4	5	300.0	41.80054	-107.75926
P45264W	09/26/1978	Complete	BP America Production Co.	STK	021N	092W	13	NE1/4SW1/4	4	200.0	41.78966	-107.74963
P140256W	10/18/2001	Complete	BP America Production Co.	MIS	021N	092W	19	SE1/4NW1/4	20	780.0	41.77896	-107.84651
P140255W	10/18/2001	Complete	BP America Production Co.	MIS	021N	092W	32	NE1/4SW1/4	20	1,040.0	41.74634	-107.82726
P63187W	02/01/1983	Complete	BP America Production Co.	STK	021N	092W	32	NE1/4SW1/4	20	1,040.0	41.74634	-107.82726
P144612W	05/23/2002	Complete	BP America Production Co.	STK	021N	092W	35	SE1/4SW1/4	10	340.0	41.74255	-107.76920
P6384P	12/31/1933	Complete	BP America Production Co.	STK	021N	093W	1	NW1/4SW1/4	20	230.0	41.81878	-107.87102
P97904W	11/09/1994	--	BP America Production Co.	MIS	021N	093W	5	SW1/4SW1/4	50	--	41.81521	-107.94828
P6391P	12/31/1930	Complete	BP America Production Co.	STK	021N	093W	9	NE1/4NW1/4	25	-1.0	41.81166	-107.92396
P6390P	12/31/1925	Complete	BP America Production Co.	STK	021N	093W	11	SW1/4NW1/4	20	-1.0	41.80799	-107.89029
P174640W	01/19/2006	--	BP America Production Co.	STK	021N	093W	17	SW1/4NE1/4	25	--	41.79360	-107.93842
P157244W	02/24/2004	--	BP America Production Co.	MIS	021N	093W	23	SE1/4SW1/4	50	--	41.77189	-107.88530
P38302W	06/09/1977	Complete	BP America Production Co.	DOM; STK	021N	093W	29	NW1/4SW1/4	12	300.0	41.76100	-107.94810
P174639W	01/19/2006	--	BP America Production Co.	STK	021N	093W	33	SE1/4NE1/4	25	--	41.75020	-107.91425
P189501W	11/24/2008	Incomplete	BP America Production Co.	MIS	021N	093W	35	NW1/4SW1/4	150	--	41.74600	-107.89019
P133248W	03/27/2001	--	BP America Production Co.	MIS	021N	094W	3	NE1/4SW1/4	0	--	41.81905	-108.02074
P194809W	12/20/2010	Complete	BP America Production Co.	MIS	021N	094W	3	NE1/4SW1/4	50	762.0	41.81808	-108.02107
P7540P	06/03/1965	Complete	BP America Production Co.	STK	021N	094W	19	SE1/4NE1/4	15	476.0	41.77926	-108.06899
P26026W	02/27/1974	Complete	BP America Production Co.	STK	021N	094W	21	SW1/4SE1/4	10	500.0	41.77200	-108.03515
P6385P	12/31/1935	Complete	BP America Production Co.	STK	021N	094W	23	NW1/4SE1/4	15	-1.0	41.77552	-107.99646
P172629W	12/20/2005	--	BP America Production Co.	MIS	021N	094W	26	NW1/4SE1/4	150	--	41.76106	-107.99646
P194165W	10/21/2010	Complete	BP America Production Co.	MIS	021N	094W	26	SW1/4NE1/4	50	740.0	41.76310	-107.99508
P193950W	08/04/2010	Complete	BP America Production Co.	STK	021N	094W	29	SW1/4SE1/4	14	880.0	41.75762	-108.05540
P14749W	07/21/1972	Complete	BP America Production Co.	STK	021N	094W	31	NE1/4NW1/4	5	300.0	41.75394	-108.07867
P33605W	06/09/1976	Complete	BP America Production Co.	STK	021N	094W	31	SE1/4SE1/4	10	700.0	41.74306	-108.06903

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P68912W	10/30/1984	Complete	BP America Production Co.	STK	021N	094W	31	NE1/4NW1/4	14	480.0	41.75394	-108.07867
P7541P	12/31/1949	Complete	BP America Production Co.	STK	021N	094W	33	SE1/4SW1/4	15	260.0	41.74301	-108.04003
P14278W	06/07/1972	Complete	BP America Production Co.	DOM; STK	021N	095W	5	NW1/4NW1/4	7	400.0	41.82654	-108.17989
P26615W	04/30/1974	Complete	BP America Production Co.	STK	021N	095W	9	NE1/4NE1/4	5	300.0	41.81203	-108.14609
P25053W	11/19/1973	Complete	BP America Production Co.	STK	021N	095W	17	SE1/4SE1/4	10	380.0	41.78670	-108.16555
P102713W	05/16/1996	Complete	BP America Production Co.	STK	021N	095W	19	SE1/4SW1/4	15	660.0	41.77227	-108.19459
P7539P	12/31/1944	Complete	BP America Production Co.	STK	021N	095W	23	SE1/4SE1/4	20	160.0	41.77215	-108.10766
P84124W	12/10/1990	Complete	BP America Production Co.	STK	021N	095W	26	SE1/4SW1/4	15	730.0	41.75770	-108.11737
P7821W	12/15/1970	Complete	BP America Production Co.	STK	021N	095W	30	NE1/4SW1/4	25	9,406.0	41.76142	-108.19469
P164658W	01/05/2005	--	BP America Production Co.	MIS	021N	095W	34	NW1/4SW1/4	140	--	41.74688	-108.14156
P186747W	04/25/2008	Incomplete	BP America Production Co.	MIS	021N	095W	34	NW1/4SW1/4	140	--	41.74633	-108.14162
P7538P	12/31/1939	Complete	BP America Production Co.	STK	021N	095W	34	SW1/4NW1/4	10	185.0	41.75051	-108.14154
P165697W	03/21/2005	--	BP America Production Co.	MIS	021N	096W	4	NE1/4SW1/4	200	--	41.81918	-108.27169
P106611W	06/30/1997	Incomplete	BP America Production Co.	MIS	021N	097W	35	NE1/4NE1/4	60	840.0	41.75479	-108.33956
P192788W	04/13/2010	Incomplete	BP America Production Co.	DOM; STK	022N	091W	9	SW1/4SE1/4	25	--	41.88688	-107.68661
P8459P	06/23/1967	Complete	BP America Production Co.	STK	022N	091W	15	NE1/4SE1/4	10	178.0	41.87633	-107.66241
P80716W	09/18/1989	Complete	BP America Production Co.	DOM; STK	022N	091W	27	NE1/4SE1/4	16	130.0	41.84747	-107.66244
P8458P	06/07/1953	Complete	BP America Production Co.	DOM; STK	022N	091W	27	NW1/4SW1/4	25	-1.0	41.84750	-107.67696
P83544W	09/10/1990	Complete	BP America Production Co.	STK	022N	092W	12	SW1/4SW1/4	5	6.0	41.88741	-107.75418
P40644P	10/25/1977	Complete	BP America Production Co.	STK	022N	092W	15	SE1/4SE1/4	1	200.0	41.87295	-107.77838
P40645P	10/25/1977	Complete	BP America Production Co.	STK	022N	092W	27	SE1/4SW1/4	1	200.0	41.84405	-107.78795
P55208W	07/05/1979	Complete	BP America Production Co.	STK	022N	092W	29	NE1/4SW1/4	25	500.0	41.84772	-107.82679
P161084W	08/04/2004	--	BP America Production Co.	MIS	022N	092W	35	NW1/4NW1/4	200	--	41.84044	-107.77352
P55207W	07/05/1979	Complete	BP America Production Co.	STK	022N	092W	35	SE1/4SW1/4	25	940.0	41.82958	-107.76877
P9820W	07/19/1971	Complete	BP America Production Co.	STK	022N	093W	10	NE1/4SW1/4	25	990.0	41.89097	-107.90474
P55206W	07/05/1979	Complete	BP America Production Co.	STK	022N	093W	13	NW1/4SW1/4	25	550.0	41.87656	-107.87095
P161336W	08/12/2004	--	BP America Production Co.	MIS	022N	093W	15	NW1/4NW1/4	200	---	41.88378	-107.90960
P5987W	07/10/1970	Complete	BP America Production Co.	STK	022N	093W	19	SW1/4NE1/4	10	260.0	41.86582	-107.95785
P6383P	12/31/1924	Complete	BP America Production Co.	STK	022N	093W	21	SW1/4SW1/4	10	190.0	41.85844	-107.92887
P155607W	12/19/2003	--	BP America Production Co.	MIS	022N	093W	25	NW1/4NW1/4	80	--	41.85484	-107.87094
P40647P	10/25/1977	Complete	BP America Production Co.	STK	022N	093W	25	NW1/4SE1/4	1	200.0	41.84767	-107.86131
P40646P	10/25/1977	Complete	BP America Production Co.	STK	022N	093W	29	SW1/4SW1/4	1	200.0	41.84415	-107.94832
P139354W	09/24/2001	--	BP America Production Co.	MIS	022N	093W	32	SW1/4NE1/4	75	--	41.83689	-107.93870
P180894W	03/22/2007	--	BP America Production Co.	MIS	022N	093W	32	SE1/4NW1/4	85	--	41.83692	-107.94354
P6382P	12/31/1916	Complete	BP America Production Co.	DOM; STK	022N	093W	32	NE1/4NE1/4	10	200.0	41.84048	-107.93384
P152233W	07/29/2003	--	BP America Production Co.	STK	022N	093W	36	NE1/4NE1/4	25	--	41.84047	-107.85648
P16769W	11/29/1972	Complete	BP America Production Co.	STK	022N	093W	36	NE1/4NE1/4	25	300.0	41.84047	-107.85648
P144035W	04/23/2002	--	BP America Production Co.	MIS	022N	094W	9	SW1/4SW1/4	50	--	41.88761	-108.04488
P174641W	01/19/2006	--	BP America Production Co.	STK	022N	094W	9	NW1/4NE1/4	25	--	41.89838	-108.03520
P194811W	12/20/2010	Complete	BP America Production Co.	MIS	022N	094W	15	NW1/4SW1/4	50	1,160.0	41.87522	-108.02391

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P144036W	04/23/2002		BP America Production Co.	MIS	022N	094W	17	SW1/4SW1/4	50	--	41.87301	-108.06436
P6386P	12/31/1930	Complete	BP America Production Co.	DOM; STK	022N	094W	18	SW1/4SW1/4	20	700.0	41.87334	-108.08335
P98626W	03/31/1995	Complete	BP America Production Co.	STK	022N	094W	18	SW1/4SW1/4	5	500.0	41.87334	-108.08335
P193743W	09/01/2010	Complete	BP America Production Co.	MIS	022N	094W	21	SW1/4SW1/4	50	1,040.0	41.86035	-108.04352
P146579W	08/22/2002	Complete	BP America Production Co.	MIS	022N	094W	22	NW1/4SW1/4	40	1,080.0	41.86219	-108.02552
P194808W	12/20/2010	Complete	BP America Production Co.	MIS	022N	094W	23	SE1/4SW1/4	50	900.0	41.86036	-108.00269
P144638W	05/31/2002	Complete	BP America Production Co.	MIS	022N	094W	28	SW1/4SW1/4	65	1,040.0	41.84410	-108.04492
P138671W	08/28/2001	--	BP America Production Co.	MIS	022N	094W	29	SE1/4SW1/4	50	--	41.84420	-108.05938
P194810W	12/20/2010	Complete	BP America Production Co.	MIS	022N	094W	29	SE1/4SW1/4	50	960.0	41.84551	-108.06141
P99887W	07/27/1995	Incomplete	BP America Production Co.	MIS	022N	094W	34	SW1/4SW1/4	50	710.0	41.82977	-108.02548
P107546W	09/18/1997	Complete	BP America Production Co.	MON	022N	094W	35	SW1/4NW1/4	0	50.0	41.83689	-108.00610
P107547W	09/18/1997	Complete	BP America Production Co.	MON	022N	094W	35	SE1/4NW1/4	0	50.0	41.83689	-108.00128
P107548W	09/18/1997	Complete	BP America Production Co.	MON	022N	094W	35	SE1/4NW1/4	0	50.0	41.83689	-108.00128
P107549W	09/18/1997	Complete	BP America Production Co.	MON	022N	094W	35	SW1/4NW1/4	0	50.0	41.83689	-108.00610
P135750W	06/14/2001	Complete	BP America Production Co.	MON	022N	094W	35	SE1/4NW1/4	0	45.0	41.83689	-108.00128
P135751W	06/14/2001	Complete	BP America Production Co.	MON	022N	094W	35	SE1/4NW1/4	0	45.0	41.83689	-108.00128
P152924W	08/07/2003	--	BP America Production Co.	MIS	022N	095W	5	NE1/4SW1/4	150	--	41.90617	-108.17485
P22748W	06/25/1973	Complete	BP America Production Co.	DOM; STK	022N	095W	7	NE1/4NW1/4	5	250.0	41.89895	-108.19422
P109956W	05/04/1998	--	BP America Production Co.	MIS	022N	095W	11	NW1/4SE1/4	50	--	41.89184	-108.11179
P169649W	07/13/2005	--	BP America Production Co.	MIS	022N	095W	11	NW1/4SE1/4	50	810.0	41.89184	-108.11179
P153998W	09/05/2003	--	BP America Production Co.	STK	022N	095W	13	NW1/4SE1/4	25	--	41.87721	-108.09257
P171025W	10/21/2005	--	BP America Production Co.	MIS	022N	095W	16	NE1/4NW1/4	200	--	41.88451	-108.15548
P183656W	10/25/2007	--	BP America Production Co.	MIS	022N	095W	18	SE1/4SE1/4	120	--	41.87359	-108.18444
P33169W	05/07/1976	Complete	BP America Production Co.	DOM; STK	022N	095W	21	SE1/4NE1/4	5	260.0	41.86651	-108.14567
P158019W	04/13/2004	Complete	BP America Production Co.	STK	022N	095W	28	SE1/4NE1/4	13	880.0	41.85205	-108.14572
P64146W	05/23/1983	Complete	BP America Production Co.	STK	022N	095W	29	NW1/4NW1/4	18	400.0	41.85547	-108.17969
P33168W	05/07/1976	Complete	BP America Production Co.	DOM	022N	095W	35	SE1/4SE1/4	5	400.0	41.83010	-108.10725
P30390W	07/07/1975	Complete	BP America Production Co.	DOM	022N	096W	1	NE1/4NE1/4	10	200.0	41.91335	-108.20373
P153994W	09/05/2003	Complete	BP America Production Co.	STK	022N	096W	11	SW1/4SW1/4	12	880.0	41.88794	-108.23797
P178919W	12/11/2006	Incomplete	BP America Production Co.	DOM; IRR; STK	022N	096W	15	NE1/4SE1/4	100	--	41.87711	-108.24280
P42749W	04/06/1978	--	BP America Production Co.	DOM; STK	022N	096W	17	NW1/4SE1/4	25	--	41.87701	-108.28632
P8466P	05/20/1968	Complete	BP America Production Co.	STK	023N	091W	3	NW1/4NW1/4	10	150.0	41.99933	-107.67635
P59387W	01/27/1982	Complete	BP America Production Co.	STK	023N	091W	10	SW1/4NE1/4	0	1,000.0	41.98130	-107.66695
P7349W	11/04/1970	Complete	BP America Production Co.	STK	023N	091W	10	SW1/4NE1/4	15	1,000.0	41.98130	-107.66695
P8467P	05/25/1968	Complete	BP America Production Co.	STK	023N	091W	15	NW1/4NW1/4	10	160.0	41.97041	-107.67664
P6093W	07/16/1970	Complete	BP America Production Co.	DOM; STK	023N	091W	33	NE1/4SW1/4	10	160.0	41.91979	-107.69117
P7823W	12/15/1970	Complete	BP America Production Co.	STK	023N	092W	2	SE1/4SW1/4	6	1,013.0	41.98853	-107.76788
P48078W	05/14/1979	Incomplete	BP America Production Co.	MIS; MON	023N	092W	5	SE1/4SE1/4	0	100.0	41.98852	-107.81667
P48079W	05/14/1979	Incomplete	BP America Production Co.	MIS; MON	023N	092W	6	NE1/4NW1/4	0	100.0	41.99947	-107.84559
P189970W	03/27/2009	Incomplete	BP America Production Co.	STK	023N	092W	19	NW1/4SW1/4	25	--	41.94836	-107.85124

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	Twn	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P14957P	09/25/1954	Complete	BP America Production Co.	STK	023N	092W	25	NE1/4NE1/4	25	230.0	41.94149	-107.73916
P14958P	12/29/1959	Complete	BP America Production Co.	STK	023N	092W	31	NE1/4SW1/4	25	406.0	41.91999	-107.84626
P14959P	08/28/1957	Complete	BP America Production Co.	STK	023N	093W	3	NE1/4SE1/4	25	201.0	41.99224	-107.89529
P2170P	03/16/1968	Complete	BP America Production Co.	STK	023N	093W	16	SE1/4SW1/4	25	900.0	41.95972	-107.92410
P7824W	12/15/1970	Complete	BP America Production Co.	STK	023N	093W	24	NE1/4SW1/4	5	1,005.0	41.94886	-107.86603
P59662W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NW1/4SE1/4	0	170.0	41.99252	-108.01555
P59663W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NW1/4SE1/4	0	170.0	41.99252	-108.01555
P59667W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NW1/4SE1/4	0	120.0	41.99252	-108.01555
P59668W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NE1/4SE1/4	0	140.0	41.99251	-108.01070
P59669W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NE1/4SE1/4	0	170.0	41.99251	-108.01070
P59670W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NE1/4SE1/4	0	170.0	41.99251	-108.01070
P59673W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NE1/4SE1/4	0	50.0	41.99251	-108.01070
P59679W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	NW1/4SE1/4	0	170.0	41.99252	-108.01555
P59682W	11/10/1981	Complete	BP America Production Co.	MON	023N	094W	3	NW1/4SE1/4	0	170.0	41.99252	-108.01555
P59683W	11/10/1981	--	BP America Production Co.	MON	023N	094W	3	SW1/4SE1/4	0	170.0	41.98892	-108.01554
P59664W	11/10/1981	--	BP America Production Co.	MON	023N	094W	10	SE1/4NE1/4	0	160.0	41.98171	-108.01072
P59665W	11/10/1981	--	BP America Production Co.	MON	023N	094W	10	SE1/4NE1/4	0	92.0	41.98171	-108.01072
P59666W	11/10/1981	--	BP America Production Co.	MON	023N	094W	10	SE1/4NE1/4	0	40.0	41.98171	-108.01072
P59677W	11/10/1981	--	BP America Production Co.	MON	023N	094W	10	NW1/4NE1/4	0	70.0	41.98532	-108.01554
P59678W	11/10/1981	--	BP America Production Co.	MON	023N	094W	10	NW1/4NE1/4	0	160.0	41.98532	-108.01554
P66216W	01/09/1984	Complete	BP America Production Co.	MON	023N	094W	10	SE1/4SW1/4	0	75.0	41.97454	-108.02043
P165873W	03/25/2005	--	BP America Production Co.	MIS	023N	094W	13	NW1/4NW1/4	40	--	41.97073	-107.98653
P6388P	12/31/1941	Complete	BP America Production Co.	STK	023N	094W	13	NW1/4NW1/4	20	-1.0	41.97073	-107.98653
P74971W	06/19/1987	--	BP America Production Co.	MON	023N	094W	14	SW1/4SW1/4	0	60.0	41.96010	-108.00595
P7825W	12/15/1970	Complete	BP America Production Co.	STK	023N	094W	14	SE1/4SE1/4	8	980.0	41.95995	-107.99142
P158018W	04/13/2004	Complete	BP America Production Co.	STK	023N	094W	15	SE1/4SW1/4	7	300.0	41.96013	-108.02049
P6387P	12/31/1940	Complete	BP America Production Co.	STK	023N	094W	19	NW1/4NW1/4	12	-1.0	41.95668	-108.08318
P159305W	06/01/2004	Complete	BP America Production Co.	STK	023N	094W	28	SE1/4SW1/4	15	300.0	41.93126	-108.04001
P158271W	04/23/2004	Complete	BP America Production Co.	STK	023N	094W	29	NE1/4SW1/4	25	640.0	41.93497	-108.05933
P157885W	02/02/2004	Complete	BP America Production Co.	STK	023N	094W	31	SE1/4SW1/4	14	800.0	41.91689	-108.07877
P147784W	10/28/2002	--	BP America Production Co.	MIS	023N	094W	35	SW1/4SW1/4	50	1,500.0	41.91660	-108.00615
P157884W	02/02/2004	Complete	BP America Production Co.	STK	023N	094W	35	SW1/4NE1/4	14	250.0	41.92385	-107.99642
P169652W	08/02/2005	--	BP America Production Co.	MIS	023N	095W	14	NW1/4SE1/4	100	--	41.96406	-108.11167
P38301W	06/09/1977	Complete	BP America Production Co.	DOM; STK	023N	095W	25	SW1/4SW1/4	15	300.0	41.93141	-108.10227
P31006W	09/10/1975	Complete	BP America Production Co.	DOM; STK	023N	095W	29	SE1/4SW1/4	10	160.0	41.93146	-108.17472
P153997W	09/05/2003	--	BP America Production Co.	STK	023N	095W	31	NW1/4SW1/4	25		41.92060	-108.19892
P153287W	08/21/2003	--	BP America Production Co.	MIS	023N	095W	33	SW1/4SW1/4	90	850.0	41.91703	-108.16030
P156171W	05/06/2003	Complete	WILLIAM H. & SALLY JOLLEY	STK	023N	096W	1	SW1/4NW1/4	20	80.0	41.99653	-108.21803
P161187W	08/04/2004	--	Bureau of Land Management	MIS	023N	096W	2	SE1/4SW1/4	200		41.98921	-108.23263
P155774W	05/06/2003	Complete	WILLIAM H. & SALLY JOLLEY	STK	023N	096W	5	NW1/4SE1/4	15	380.0	41.99277	-108.28588

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P153993W	09/05/2003	Complete	USDI BLM	STK	023N	096W	13	NW1/4SE1/4	6	200.0	41.96396	-108.20841
P153996W	09/05/2003	Complete	Statton Sheep Co.	STK	023N	096W	17	SE1/4NW1/4	14	486.0	41.96742	-108.29089
P155771W	04/30/2003	Complete	WILLIAM OR SALLY JOLLY	STK	023N	096W	17	SE1/4NW1/4	25	400.0	41.96744	-108.29087
P155770W	04/30/2003	Complete	WILLIAM H. OR SALLY K. JOLLY	STK	023N	096W	18	SE1/4NW1/4	20	400.0	41.96774	-108.30940
P156170W	04/30/2003	Complete	WILLIAM H. OR SALLY K. JOLLY	STK	023N	096W	21	SE1/4NW1/4	20	480.0	41.95296	-108.27157
P35720W	12/07/1976	Complete	USDI BLM	STK	023N	096W	25	NW1/4NW1/4	25	1,160.0	41.94222	-108.21812
P105976W	05/29/1997	--	THERESA F/WILLIAM M THOMPSON	DOM	023N	096W	33	SW1/4SW1/4	25	--	41.91679	-108.27661
P189475W	12/29/2008	Incomplete	MAEVE AND LLIAM FITZGERALD	DOM	023N	096W	33	SW1/4SW1/4	25	--	41.91628	-108.27657
P153992W	09/05/2003	--	Statton Sheep Co.	STK	023N	096W	34	SW1/4SW1/4	25	--	41.91684	-108.25717
P156174W	05/06/2003	Complete	WILLIAM H. & SALLY JOLLEY	STK	023N	097W	11	NW1/4NE1/4	20	250.0	41.98558	-108.34454
P55107W	12/24/1980	Complete	--	STK	023N	097W	13	SE1/4SE1/4	20	100.0	41.96154	-108.32026
P177239W	09/11/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	16	SW1/4SW1/4	25	--	41.95988	-108.39298
P177240W	09/11/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	16	SW1/4NW1/4	25	--	41.96882	-108.39506
P190519W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	16	SW1/4NE1/4	25	--	41.96835	-108.38332
P190520W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	16	SW1/4SW1/4	25	--	41.96119	-108.39307
P194471W	11/23/2010	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	16	SW1/4NW1/4	25	--	41.96830	-108.39514
P175678W	07/13/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4NE1/4	25	--	41.93983	-108.34451
P175679W	07/13/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4SE1/4	25	--	41.93259	-108.34451
P175681W	07/13/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4SW1/4	25	--	41.93259	-108.35420
P175682W	07/13/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4NW1/4	25	--	41.93983	-108.35421
P190537W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4NW1/4	25	--	41.93938	-108.35421
P190538W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4SW1/4	25	--	41.93214	-108.35408
P190540W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4SE1/4	25	--	41.93192	-108.34555
P190541W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	26	SW1/4NE1/4	25	--	41.93940	-108.34447
P174818W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4NE1/4	25	--	41.92896	-108.33966
P174819W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4NW1/4	25	--	41.92897	-108.34936
P174833W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4SE1/4	25	--	41.92172	-108.33966
P174834W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4SW1/4	25	--	41.92172	-108.34935
P176195W	07/27/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	SW1/4SW1/4	25	--	41.91797	-108.35420
P176196W	07/27/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	SW1/4NE1/4	25	--	41.92534	-108.34451
P190515W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4NE1/4	25	--	41.92849	-108.33962
P190516W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4NW1/4	25	--	41.92850	-108.34934
P190517W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4SE1/4	25	--	41.92138	-108.33964
P190518W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	NE1/4SW1/4	25	--	41.92121	-108.34929
P190544W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	35	SW1/4SW1/4	25	--	41.91747	-108.35414
P174815W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	NE1/4NW1/4	25	--	41.93057	-108.32997
P174816W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	NE1/4SE1/4	25	--	41.92181	-108.31999
P174817W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	NE1/4SW1/4	25	--	41.92172	-108.32997
P174820W	05/25/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	NE1/4NE1/4	25	--	41.93052	-108.32009
P175560W	06/27/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	SW1/4SE1/4	25	--	41.91787	-108.32513



# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P175561W	06/27/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	SW1/4SW1/4	25	--	41.91892	-108.33720
P175563W	06/27/2006	--	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	SW1/4NE1/4	25	--	41.92468	-108.32467
P190542W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	SW1/4SW1/4	25	--	41.91748	-108.33621
P190543W	03/09/2009	Incomplete	Pinnacle Gas Resources, Inc.	CBM	023N	097W	36	SW1/4SE1/4	25	--	41.91734	-108.32519
P189971W	03/27/2009	Incomplete	WYOMING GAME AND FISH COMMISSION	STK	024N	091W	31	NE1/4SW1/4	25	--	42.00619	-107.72949
P25189P	12/13/1973	Complete	--	STK	024N	091W	31	NW1/4NW1/4	25	-1.0	42.01389	-107.73401
P14956P	08/31/1957	Complete	--	STK	024N	092W	33	NE1/4SE1/4	25	300.0	42.00665	-107.79677
P48075W	05/14/1979	Incomplete	Kennecott Uranium Co.	MIS; MON	024N	093W	32	NW1/4NW1/4	0	200.0	42.01408	-107.94842
P48076W	05/14/1979	Incomplete	Kennecott Uranium Co.	MIS; MON	024N	093W	32	SE1/4SE1/4	0	150.0	42.00325	-107.93408
P48080W	05/14/1979	Incomplete	Kennecott Uranium Co.	MIS; MON	024N	093W	33	SE1/4SE1/4	0	150.0	42.00321	-107.91471
P48074W	05/14/1979	Incomplete	Kennecott Uranium Co.	MIS; MON	024N	093W	35	NW1/4SW1/4	0	150.0	42.00681	-107.89040
P48388W	05/31/1979	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	415.0	42.08288	-107.98630
P48389W	05/31/1979	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	415.0	42.08288	-107.98630
P48390W	05/31/1979	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	415.0	42.08288	-107.98630
P48391W	05/31/1979	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	450.0	42.08288	-107.98630
P48392W	05/31/1979	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	330.0	42.08288	-107.98630
P56563W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4SW1/4	0	410.0	42.07932	-107.98627
P56565W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4SW1/4	0	399.0	42.07932	-107.98627
P56566W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4NW1/4	0	496.0	42.08647	-107.98633
P56568W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	456.0	42.08288	-107.98630
P56569W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NE1/4SW1/4	0	403.0	42.07927	-107.98135
P56570W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	SE1/4NW1/4	0	415.0	42.08284	-107.98137
P56573W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4SW1/4	0	340.0	42.07932	-107.98627
P56574W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	338.0	42.08288	-107.98630
P56575W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NE1/4SW1/4	0	337.0	42.07927	-107.98135
P56576W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4SW1/4	0	340.0	42.07932	-107.98627
P56577W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NE1/4SW1/4	0	335.0	42.07927	-107.98135
P56578W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4SW1/4	0	427.0	42.07932	-107.98627
P56579W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NE1/4SW1/4	0	410.0	42.07927	-107.98135
P56580W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4SW1/4	0	423.0	42.07932	-107.98627
P56581W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	SW1/4NW1/4	0	498.0	42.08288	-107.98630
P56582W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4SW1/4	0	480.0	42.07932	-107.98627
P56583W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NE1/4SW1/4	0	418.0	42.07927	-107.98135
P58688W	10/01/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4NW1/4	0	560.0	42.08647	-107.98633
P58690W	10/01/1981	--	Kennecott Uranium Co.	MON	024N	094W	1	NW1/4NW1/4	0	420.0	42.08647	-107.98633
P56553W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	NE1/4NW1/4	0	527.0	42.08653	-108.00089
P56554W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	NE1/4NW1/4	0	590.0	42.08653	-108.00089
P56555W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	NE1/4NW1/4	0	446.0	42.08653	-108.00089
P56556W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	SE1/4SW1/4	0	477.0	42.07582	-108.00083
P56557W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	SE1/4SW1/4	0	425.0	42.07582	-108.00083

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P56558W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	SE1/4SW1/4	0	350.0	42.07582	-108.00083
P56559W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	NW1/4NW1/4	0	531.0	42.08655	-108.00573
P56560W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	SW1/4NE1/4	0	502.0	42.08293	-107.99602
P56561W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	SW1/4NE1/4	0	498.0	42.08293	-107.99602
P56564W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	SE1/4NE1/4	0	476.0	42.08291	-107.99118
P58691W	10/01/1981	--	Kennecott Uranium Co.	MON	024N	094W	2	NE1/4SE1/4	0	250.0	42.07935	-107.99115
P56562W	02/13/1981	--	Kennecott Uranium Co.	MON	024N	094W	3	SE1/4NE1/4	0	551.0	42.08298	-108.01056
P58689W	10/01/1981	--	Kennecott Uranium Co.	MON	024N	094W	12	NE1/4NW1/4	0	250.0	42.07209	-107.98133
P66215W	01/09/1984	Complete	Kennecott Uranium Co.	MON	024N	094W	16	NW1/4NW1/4	0	130.0	42.05776	-108.04439
P7826W	12/15/1970	Complete	--	STK	024N	094W	17	NE1/4SE1/4	1	1,000.0	42.05054	-108.04929
P7551W	12/21/1970	Complete	Kennecott Uranium Co.	STK	024N	094W	21	NW1/4NE1/4	10	500.0	42.04324	-108.03470
P189665W	02/17/2009	Complete	STRATTON SHEEP CO.	STK	024N	094W	22	NW1/4SE1/4	25	690.0	42.03575	-108.01481
P61326W	06/30/1982	Complete	Kennecott Uranium Co.	MON	024N	094W	25	NE1/4NW1/4	0	50.0	42.02859	-107.98144
P183115W	08/22/2007	--	USDI BLM	MIS	024N	094W	27	SW1/4SW1/4	300	--	42.01789	-108.02514
P178342W	10/17/2006	--	USDI BLM	MIS	024N	094W	30	NE1/4SW1/4	120	540.0	42.02174	-108.07832
P9742W	07/15/1971	Fully Adjudicated	Kennecott Uranium Co.	IND; STK	024N	094W	34	NE1/4NE1/4	25	170.0	42.01420	-108.01064
CR UW01/185	07/15/1971	Fully Adjudicated	Green Mountain Mining Venture	IND; STK	024N	094W	34	NE1/4NE1/4	25	--	42.01421	-108.01066
P155768W	04/30/2003	Complete	WILLIAM H. OR SALLY K. JOLLY	STK	024N	096W	8	NW1/4SE1/4	20	480.0	42.06511	-108.28573
P55109W	12/24/1980	Complete	--	STK	024N	096W	13	SE1/4SE1/4	5	300.0	42.04710	-108.20323
P55110W	12/24/1980	Complete	--	STK	024N	096W	18	SW1/4NE1/4	10	100.0	42.05417	-108.30550
P155772W	04/30/2003	Complete	WILLIAM H. OR SALLY K. JOLLY	STK	024N	096W	24	SW1/4NE1/4	20	375.0	42.03987	-108.20812
P155915W	01/13/2004	--	Statton Sheep Co.	STK	024N	096W	24	NW1/4SE1/4	25	--	42.03625	-108.20814
P189576W	01/26/2009	Incomplete	STRATTON SHEEP CO.	STK	024N	096W	24	NW1/4SE1/4	25	--	42.03624	-108.20816
P160524W	07/15/2004	Complete	USDI BLM	MIS	024N	096W	28	NE1/4NW1/4	120	710.0	42.02895	-108.27119
P186994W	04/22/2008	Incomplete	GMT EXPLORATION CO., LLC	MIS	024N	096W	28	NE1/4NW1/4	120	--	42.02847	-108.27094
P127205W	07/20/2000	Complete	USDI BLM	STK	024N	096W	35	SE1/4SW1/4	25	160.0	42.00366	-108.23255
P10695P	07/01/1948	Complete	--	STK	024N	097W	17	NE1/4NE1/4	17	255.0	42.05932	-108.40115
P127204W	07/20/2000	--	USDI BLM	STK	024N	097W	22	NW1/4SW1/4	25	--	42.03762	-108.37688
P152043W	06/09/2003	Complete	TOM BROWN, INC.	MIS	024N	097W	26	NE1/4SW1/4	50	250.0	42.02312	-108.35261
P156175W	05/06/2003	Complete	WILLIAM AND SALLY JOLLEY	MIS	024N	097W	26	NE1/4SW1/4	70	600.0	42.02311	-108.35253
P172598W	12/30/2005	--	WILLIAM H. & SALLY JOLLEY	STK	024N	097W	29	NW1/4NE1/4	25	--	42.03037	-108.40601
P155773W	05/06/2003	Complete	WILLIAM H. & SALLY JOLLEY	DOM; STK	024N	097W	35	SE1/4SE1/4	20	450.0	--	--
P36618W	03/21/1977	Complete	P H Livestock Co.	STK	024N	097W	35	SE1/4SE1/4	20	240.0	--	--
P191915W	12/01/2009	Complete	ENCANA OIL & GAS (USA) INC	MIS	024N	097W	36	SW1/4SW1/4	110	740.0	42.00491	-108.33974
P183116W	08/22/2007	Complete	J-W OPERATING COMPANY	MIS	025N	094W	31	NW1/4SE1/4	200	535.0	42.09411	-108.09269
P191570W	08/27/2009	Complete	J-W OPERATING COMPANY	MIS	025N	094W	31	NW1/4SE1/4	0	--	42.09356	-108.09354
P155775W	05/06/2003	Complete	WILLIAM AND SALLY JOLLEY	STK	025N	095W	4	NW1/4NE1/4	25	425.0	42.17406	-108.17121
P10293P	12/31/1930	Complete	Curtis Rochelle	DOM; STK	025N	096W	3	SE1/4SE1/4	10	-1.0	42.16341	-108.26352
P155769W	04/30/2003	Complete	WILLIAM H. OR SALLY K. JOLLY	STK	025N	096W	22	NW1/4SW1/4	20	400.0	42.12342	-108.27795
P10294P	12/31/1931	Complete	Curtis Rochelle	DOM; STK	025N	096W	30	SE1/4SE1/4	10	-1.0	42.10544	-108.32207

## APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-12. Groundwater rights within 1 mile of the CD-C project area, *continued***

WR Number	Priority Date	Status	Company/Individual	Uses	TwN	Rng	Sec	QtrQtr	Total Flow	Total Depth (ft)	Lat	Long
P7542P	12/31/1939	Complete	--	STK	025N	096W	36	SW1/4SW1/4	20	150.0	42.09078	-108.23932
P7954P	12/31/1939	Complete	--	STK	025N	096W	36	SW1/4SW1/4	15	150.0	42.09078	-108.23932

**Notes for non-mining-related groundwater rights within 1 mile of the CD-C project area (search conducted February 18, 2011):**

Water rights were searched to the nearest quarter-quarter of each section listed above. Any part of a quarter-quarter that lies within one miles of the CD-C project area is included. A double dash (--) indicates no information available.

**Record suffixes are denoted as follows:**

"P" Stock and domestic use wells completed prior to May 24, 1969 and registered with the State Engineer's Office prior to December 31, 1972.  
 "W" Permits are for wells with a priority date for the date of filing with the State Engineer

**Use Codes**

CBM Coal Bed Methane  
 DOM Domestic  
 IND Industrial  
 IRR Irrigation  
 MIS Miscellaneous  
 MON Monitoring  
 MUN Municipal  
 STK Stock  
 TST Test Well

Separate water rights with a status code of ABA, A&C, AME, CAN, ELI, EXP, REJ, or TRA were eliminated from the search area listing provided above (including those belonging to the mining companies), as none of these use codes represent a valid current right.

**Status Codes**

Fully Adjudicated: Well has been drilled and inspected, and a certificate of appropriation issued  
 Complete: A notice of completion off the well has been received  
 Unadjudicated: Well has not yet been inspected but may have been drilled  
 Incomplete: Notice of completion of the well has not been received  
 Expired: The permit to appropriate groundwater has expired, generally because a notice that the well has been completed has not been received within the time period specified

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

**Table F-13. Groundwater quality parameters for selected aquifers associated with the CD-C project area**

	From Mason and Miller (2005)					From Bartos <i>et al.</i> 2006					Produced Water			
	Sweetwater Co. Quaternary Aquifer	Sweetwater Co. Wasatch Aquifer	Sweetwater Co. Mesaverde Aquifer	Sweetwater Co. Nugget Aquifer	Sweetwater Co. Madison Aquifer	Carbon Co. Quaternary Aquifer	Carbon Co. Wasatch Aquifer	Carbon Co. Mesaverde Aquifer	Carbon Co. Nugget Aquifer	Carbon Co. Madison Aquifer	Sweetwater Co. Mesaverde Aquifer Produced Water	Sweetwater Co. Nugget Aquifer Produced Water	Nugget Aquifer (USGS 2011)	Madison Aquifer (USGS 2011)
<b>No. of Samples</b>	18	80	30	28	17	32	11	130	15	11	221	28	3	2
<b>Parameter</b>														
TDS (Median) (mg/L)	1,200	8,000	1,000	10,000	11,100	500	2,000	5,000	4,500	3,000	12,000	10,000	21,800	30,300
TDS (Min) (mg/L)	500	150	200	3,000	3,820	30	700	250	15,000	150	2,800	5,000	3,087	6,094
TDS (Max) (mg/L)	20,000	153,000	20,000	35,000	76,800	8,000	5,000	40,000	50,000	12,000	65,000	40,000	57,900	54,545
Selenium (Median) (µg/L)	32.9 <sup>1</sup>	0.7 <sup>2</sup>	nm <sup>7</sup>	<1 <sup>3</sup>	nm	3.9 <sup>4</sup>	0.6 <sup>5</sup>	0.6 <sup>6</sup>	nm	1.4 <sup>3</sup>	nm	nm	nm	nm
Selenium (Min) (µg/L)	3.8 <sup>1</sup>	0.3 <sup>2</sup>	nm	<1 <sup>3</sup>	nm	<0.5 <sup>4</sup>	0.4 <sup>5</sup>	<0.3 <sup>6</sup>	nm	1.4 <sup>3</sup>	nm	nm	nm	nm
Selenium (Max) (µg/L)	133 <sup>1</sup>	1.6 <sup>2</sup>	nm	<1 <sup>3</sup>	nm	4.5 <sup>4</sup>	<0.7 <sup>5</sup>	0.8 <sup>6</sup>	nm	1.4 <sup>3</sup>	nm	nm	nm	nm

<sup>1</sup> Based on 7 Samples

<sup>2</sup> Based on 8 Samples

<sup>3</sup> Based on 1 Sample

<sup>4</sup> Based on 3 Samples

<sup>5</sup> Based on 4 Samples

# APPENDIX F—WATER RESOURCES SUPPORTING DATA

Table F-14. Selected water quality parameters in flowing wells and springs within and adjacent to the CD-C project area

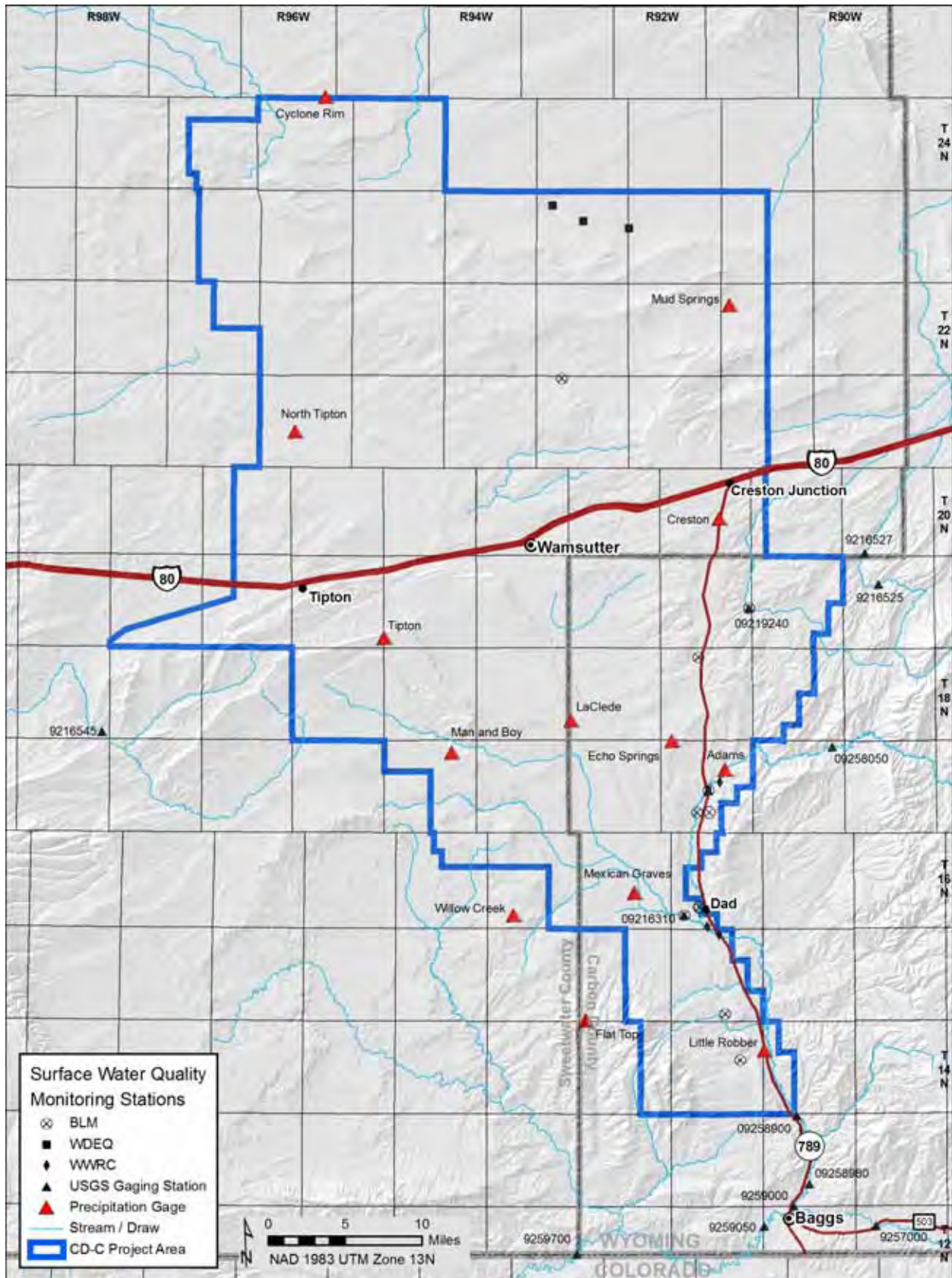
Flowing Well or Spring Water Quality																
Reporting Agency	USGS												BLM			WDEQ
Station ID	411201107413801	411149107534401	411936107455801	412758107424801	412547108030801	412932108062401	413741107513801	413725108170001	414330108125501	415340107425501	415110107554001	415638108125801	MARATHON	SUNEXPL	Micelli Well	WRDS-00053
Location	T14N R92W S12	T14N R093W S08	T16N R092W S29	T17N R92W S12	T17N R95W S24	T18N R95W S33	T19N R093W S15	T19N R97W S13	T20N R96W S10	T22N R91W S08	T22N R93W S28	T23N R96W S25	T18N R93W S10	T19N R93W S34	T21N R94W S14	T20N R94W S34
Sample period	1963	1976	1958	1958	1976	1976	1958	1958	1972	1963	1963	1976	1990	1987	1989	1973
Parameter																
Bicarbonate	719	696	453	213	403	1,080	484	458	855	157	144	1100	302	3,429	1,600	464
Calcium	34	130	120	31	25	59	450	31	0	18	190	3.6	222	294	45	3.1
Carbon Dioxide	7.3	1.8	29	5.4	4.1	43	77	18	14	10	9.2	7	nm	nm	nm	nm
Carbonate	0	0	0	0	0	0	0	0	nm	0	0	nm	0	0	0	27
Chloride	340	94	10	5	19	32	13	25	18	5.8	14	54	5.2	7.1	6,600	23
Fluoride	1.5	1.4	0.5	0.5	2.3	3.1	0.3	nm	1.9	0.4	0.1	5.2	0.38	0.62	1.62	1.4
Hardness	220	820	470	140	100	270	1,800	120	0	53	570	12	1,197	159	0	10
Magnesium	33	120	42	15	9.8	30	170	11	0	1.9	23	0.7	154			0.5
Nitrate	0.63	nm	0.43	0.18	nm	nm	0.59	2.3	0.11	0.07	0.36	nm	nm	nm	nm	nm
Nitrite + Nitrate	2.8	0.03	1.9	0.8	nm	nm	2.6	10	0.5	0.3	1.6	nm	nm	nm	nm	0.1
Noncarbonate hardness	0	250	98	0	0	0	1,400	0	0	0	450	0	nm	nm	nm	nm
pH, SU	8.2	8.8	7.4	7.8	8.2	7.6	7	7.6	8	7.4	7.4	8.4	7.4	7.2	7.66	8.6
TDS	3,590	7,210	736	497	2,590	3,270	2,430	1,580	777	479	1,780	1,050	1,998	2,201	12,755	532
Silica	5.2	13	11	6.7	13	14	18	6.4	nm	9.2	10	11	nm	nm	nm	12
Sodium + potassium	nm	nm	79	121	nm	nm	64	510	337	nm	nm	nm	nm	nm	nm	nm
Sodium	1,200	2,100	nm	nm	820	1,000	nm	nm	nm	150	320	420	107	73.2	4,550	219
Conductance, umhos/cm	5,200	8,000	1100	776	3,800	4,600	2,680	2,310	nm	769	2,330	1,850	2,200	2400	16,215	843
Sulfate	1,600	4,400	250	210	1,500	1,600	1,500	770	0	220	1,100	4.6	1,089	1,062	6	12

mg/L except as noted

nm = not measured

Source: WRDS 2007; USGS 2007

## APPENDIX F—WATER RESOURCES SUPPORTING DATA



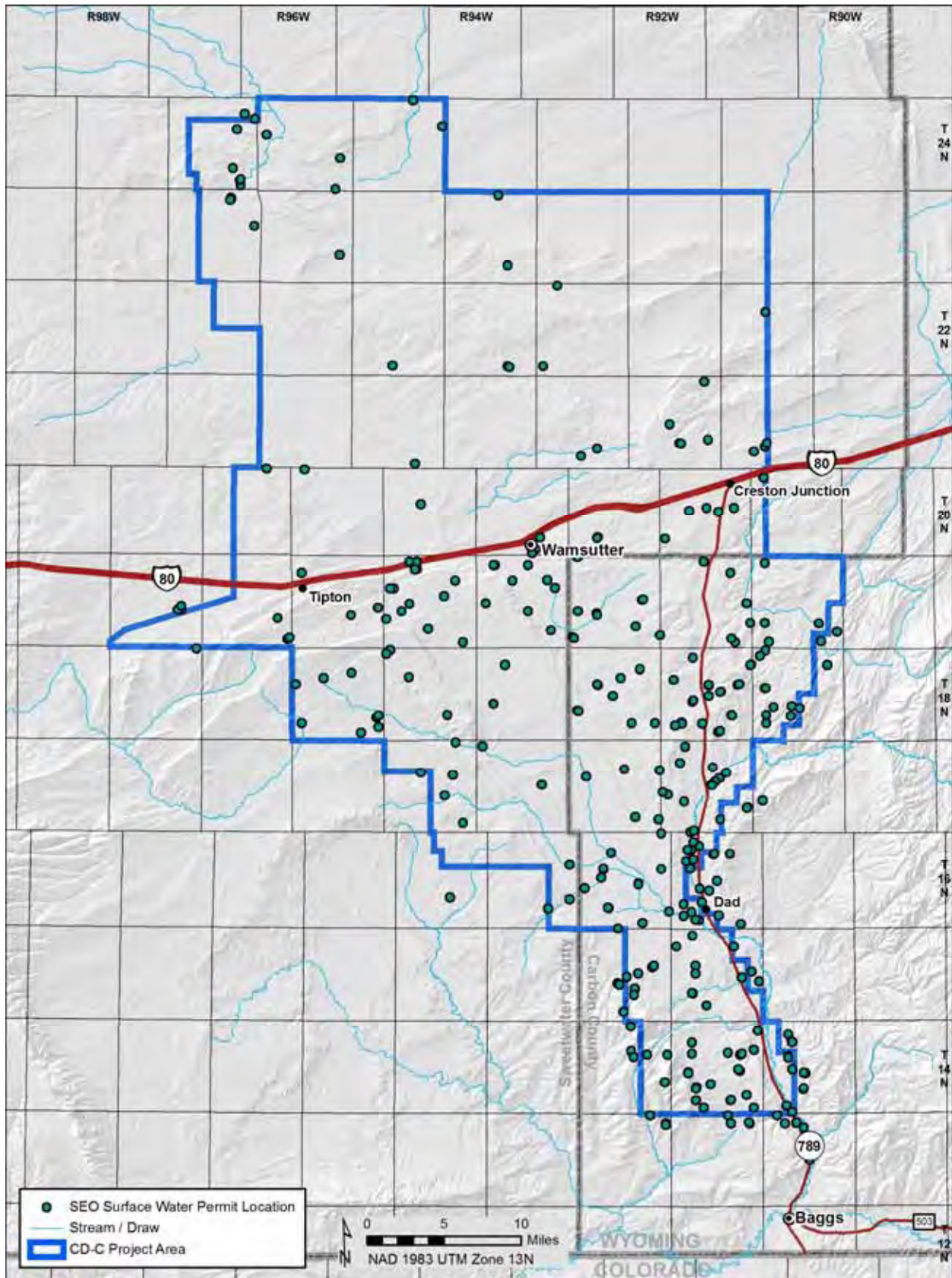
**Map F-1. Surface water monitoring sites within and adjacent to the CD-C project area**

Source: From U.S. Geological Survey, *Scientific Investigations Report 2004-5214*

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.



## APPENDIX F—WATER RESOURCES SUPPORTING DATA

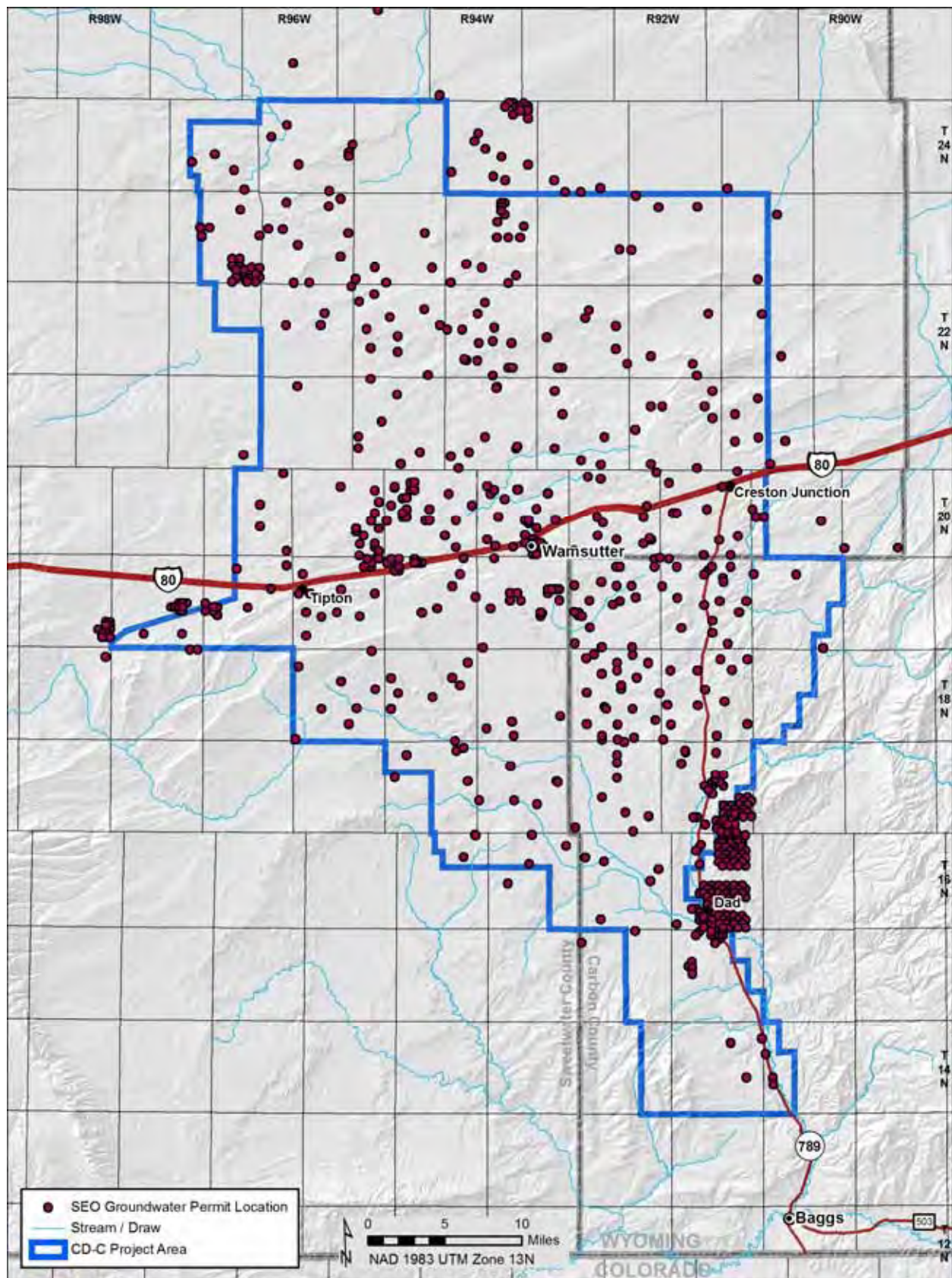


**Map F-2. Surface water rights within and adjacent to the CD-C project area**

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## APPENDIX F—WATER RESOURCES SUPPORTING DATA

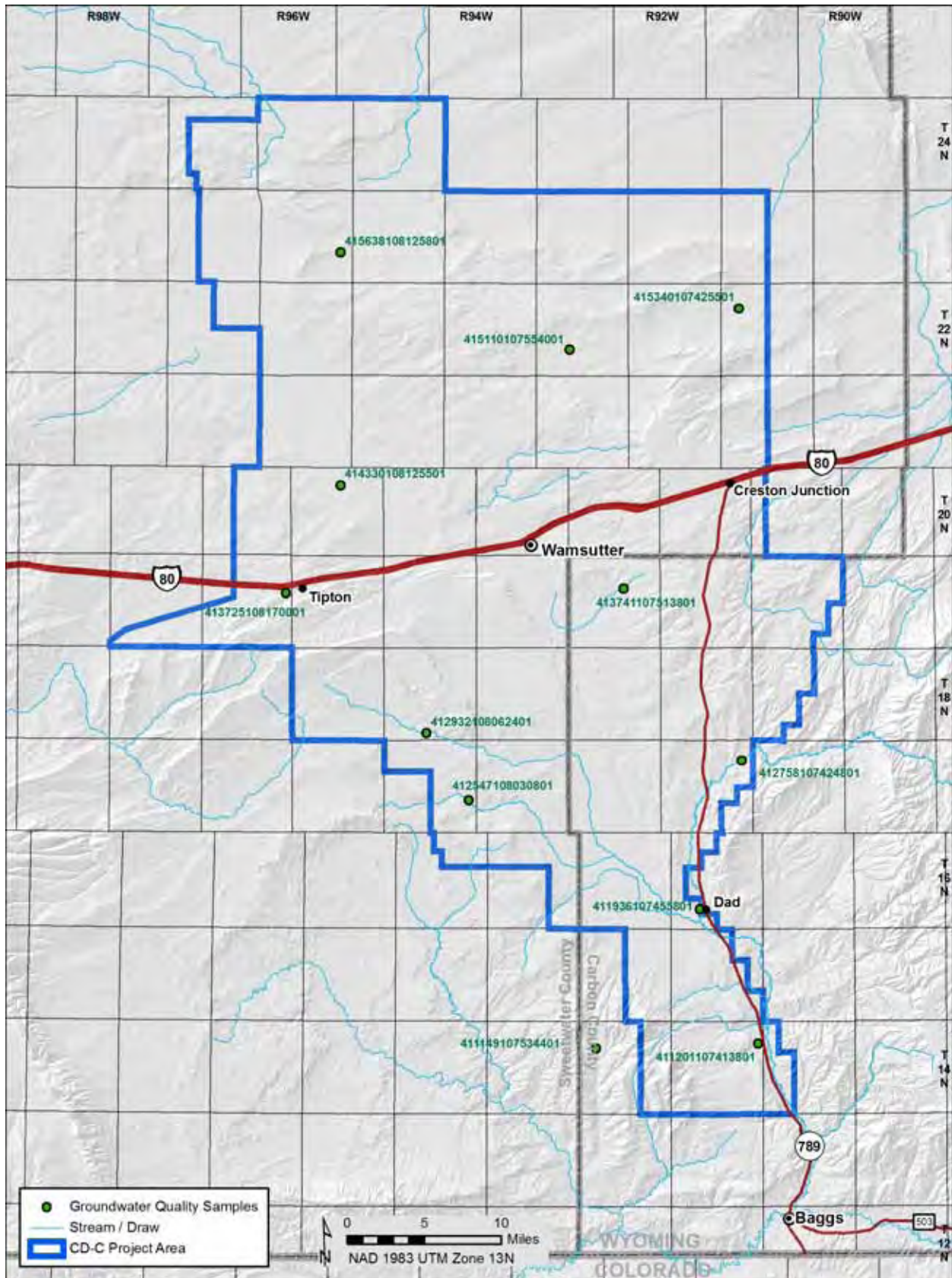


Map F-3. Groundwater rights within and adjacent to the CD-C project area

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## APPENDIX F—WATER RESOURCES SUPPORTING DATA

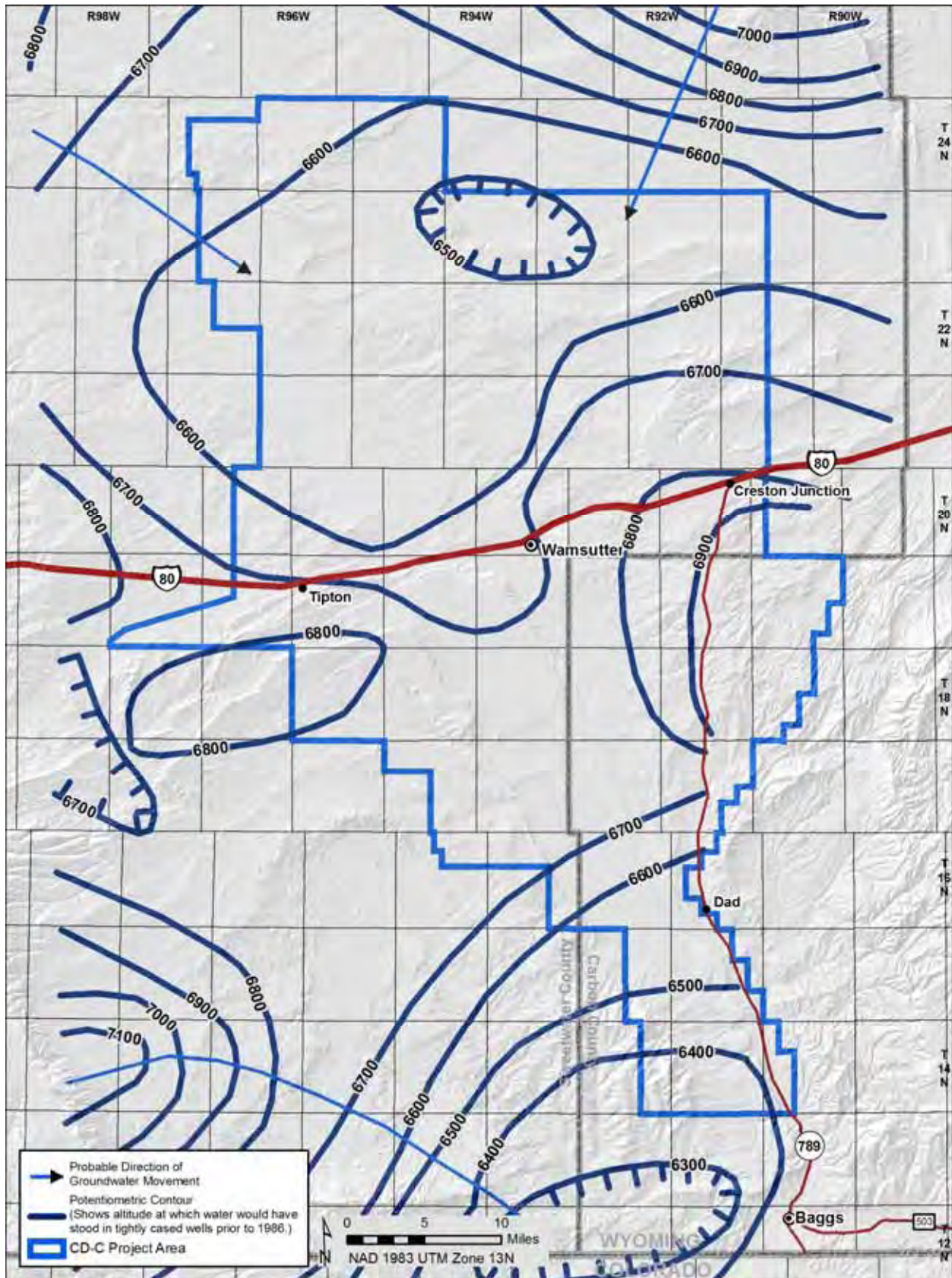


**Map F-4. Groundwater monitoring sites within and adjacent to the CD-C project area**

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## APPENDIX F—WATER RESOURCES SUPPORTING DATA



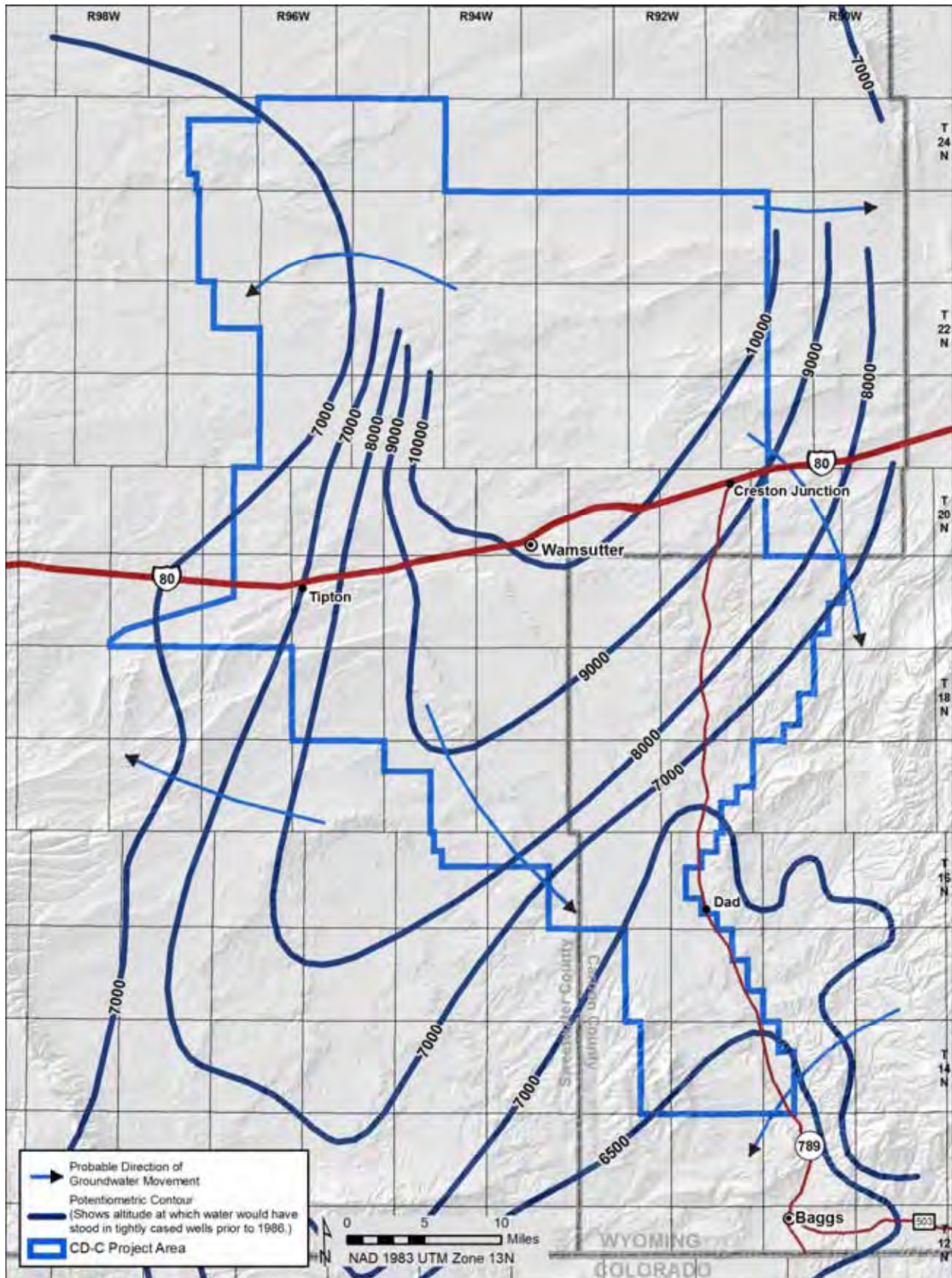
**Map F-5. Generalized potentiometric surface and groundwater flow direction, Wasatch Aquifer**

Source: U.S. Geological Survey, Scientific Investigations Report 2004-5214

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## APPENDIX F—WATER RESOURCES SUPPORTING DATA



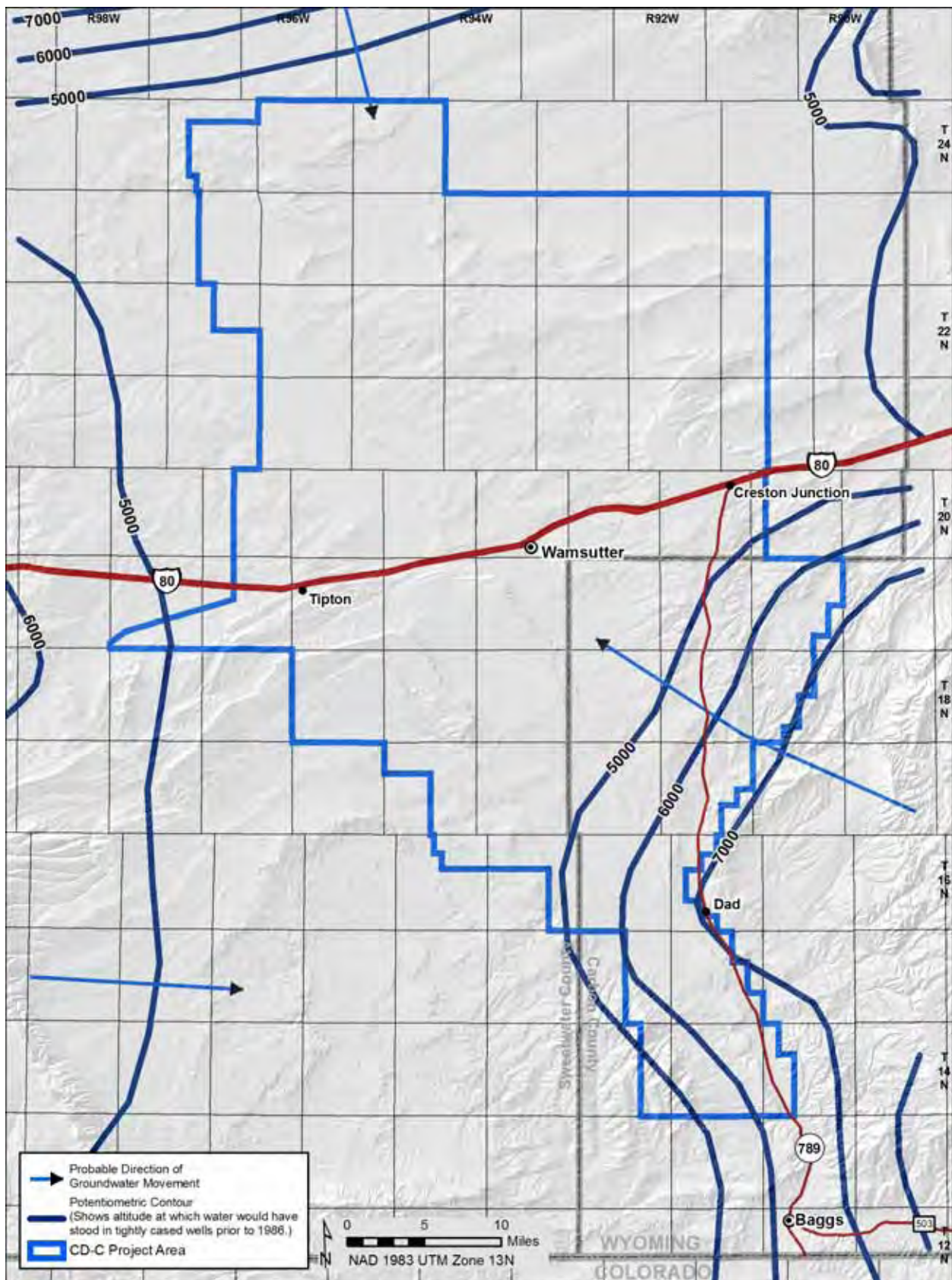
**Map F-6. Generalized potentiometric surface and groundwater flow direction, Mesaverde Aquifer**

Source: U.S. Geological Survey, Scientific Investigations Report 2004-5214

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## APPENDIX F—WATER RESOURCES SUPPORTING DATA

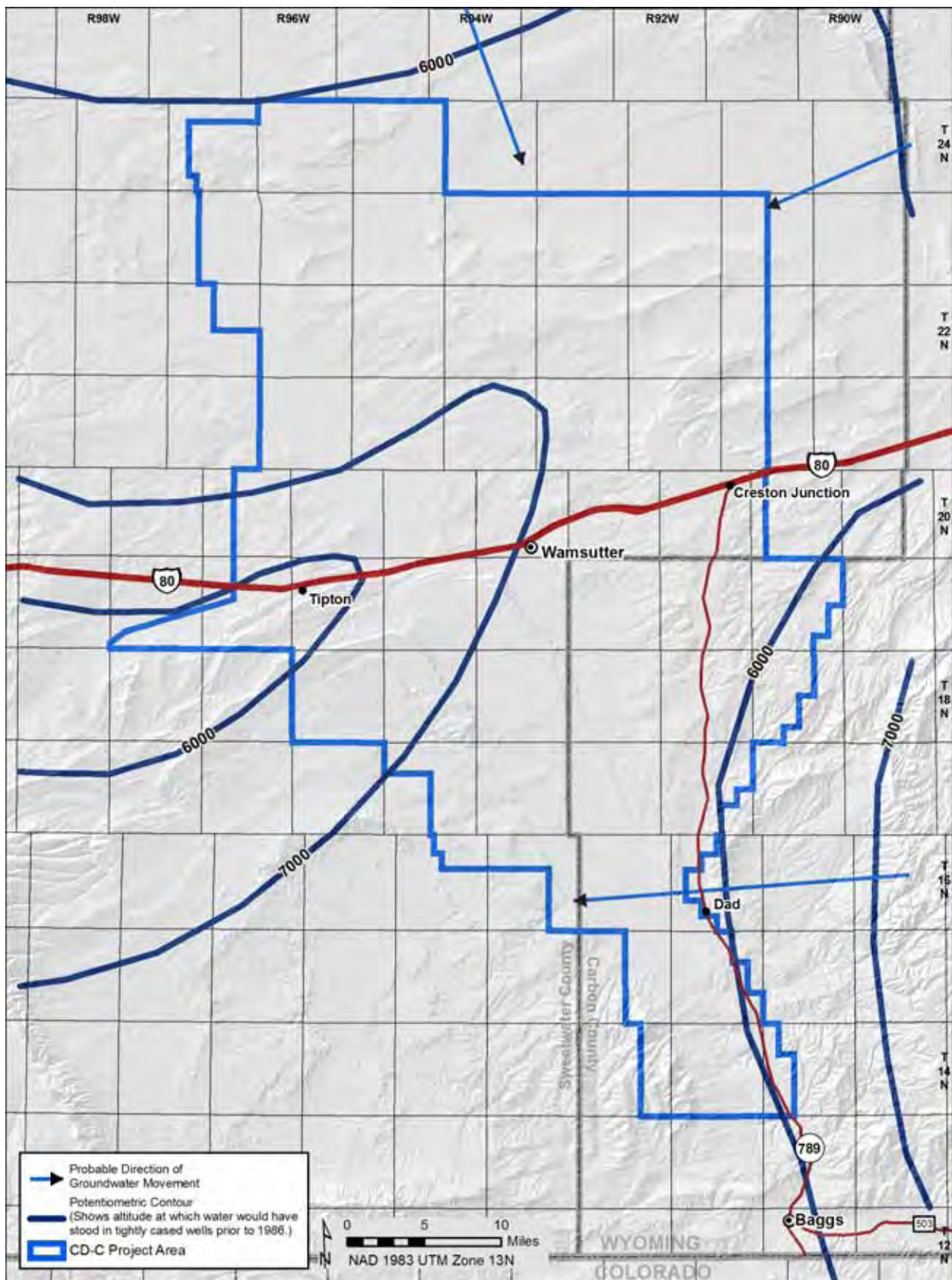


**Map F-7. Generalized potentiometric surface and groundwater flow direction, Tensleep Aquifer**

Source: U.S. Geological Survey, Scientific Investigations Report 2004-5214

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

## APPENDIX F—WATER RESOURCES SUPPORTING DATA



**Map F-8. Generalized potentiometric surface and groundwater flow direction, Madison Aquifer**

Source: U.S. Geological Survey, Scientific Investigations Report 2004-5214

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.



## APPENDIX G: ENERGY BY DESIGN—COOPERATIVE MITIGATION PLANNING FOR THE CD-C GAS FIELD

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### Preface

*Energy by Design* presents a method for determining the potential for mitigation of impacts to wildlife that may be utilized as a result of the Continental Divide-Creston (CD-C) natural gas project. BP America Production Company (BP), one of the principal operators in the CD-C project area, invited The Nature Conservancy to design a structured framework that would evaluate the potential for conflict mitigation between natural gas development and wildlife and wildlife habitat. First, the framework would identify areas that are considered to have high wildlife values within the regional landscape and should provide the most effective mitigation opportunities. Second, opportunities for mitigating unavoidable impacts between natural gas development and identified wildlife values would be evaluated.

The framework and potential mitigation opportunities described in *Energy by Design* do not have a direct association with the Proposed Action or any of the alternatives. This appendix and associated mitigation opportunities have been included in the Draft CD-C EIS for informational purposes only. This information may be utilized if the BLM's final decisions on the CD-C EIS were to include the use of off-site mitigation for impacts on wildlife and wildlife habitat.

## Introduction and Background

In many cases the environmental mitigation process for development projects is *ad hoc*, opaque, and insufficient, failing to deliver effective outcomes for biodiversity conservation (McKenney and Kiesecker 2009). Mitigation planning too often reflects a reactive, piecemeal approach, focused on site-level impacts of the next proposed project. Here we seek to balance the needs of planned developments with those of biodiversity conservation. The aim is to bring greater efficiencies to development planning and impact mitigation, and more effective conservation outcomes. We seek to improve implementation of the “mitigation hierarchy” at each stage—avoid, minimize/restore, and offset—in a way that is transparent and transferable to industry and regulators, and complementary to the environmental assessment (Kiesecker et al. 2010a). By evaluating threats and impacts at regional and site levels, in a proactive fashion, mitigation planning can steer development projects away from conservation priorities and ensure mitigation provides a higher return for conservation. We generate this up-front planning information by harnessing decades of conservation planning experience, extensive ecological data, and advanced computer-modeling tools, and applying them to assess onsite conservation values as well as to locate compensatory mitigation opportunities.

Mitigation frameworks often ask developers if they have followed the mitigation hierarchy (Council on Environmental Quality 2000) of seeking to avoid, minimize, and restore biodiversity onsite before considering an offset for the residual impacts. However, no quantitative guidelines exist to guide this decision-making process. Landscape-level planning and associated tools provide a framework to address this problem. Identifying wildlife values at a landscape scale and understanding the landscape value of local occurrences can guide decisions regarding when impacts should be avoided or when they can be offset. Placing mitigation design within a landscape-level planning framework can ensure that development actions are consistent with conservation goals.

Here we describe an analysis for the Continental Divide-Creston (CD-C) natural gas field that can be used to inform avoidance of important resources onsite within the field, as well as compensatory mitigation opportunities. BP America Production Company (BP), one of the principal operators on the field, expressed the need for a structured framework to complement the Environmental Impact Statement (EIS) that could be used to avoid potential conflicts between development and onsite wildlife values and identify opportunities to balance onsite impacts with additional conservation options to offset these impacts. BP invited The Nature Conservancy to design such a plan. First, we identified areas within the field that have high value for wildlife or other resources from a regional landscape perspective and should be given special consideration for avoiding impacts from development. Second, we identified opportunities to utilize offsets to mitigate for unavoidable impacts associated with gas development on the field. We sought to design an offset framework where the offsets are ecologically equivalent to the impacts. All methods are adapted from a previous mitigation framework in Wyoming (Kiesecker et al. 2009, Kiesecker et al. 2010b).

## Methods

The analysis for the CD-C development included six steps, each of which is described in more detail below: (1) assemble a working group, (2) identify representative biological targets, (3) gather spatial data for biological targets, (4) examine potential onsite development, (5) set impact goals for each biological target associated with the development, and (6) use the Marxan algorithm at increasing spatial extents to identify potential offset sites both on and off the project area.

**Study area.** Our study area was the 1.1-million acre CD-C natural gas field in Southern Wyoming where BP proposed a project that included drilling up to 8,950 new gas wells. The CD-C natural gas field is a high-desert xeric shrubland ecosystem that provides critical habitat for ungulates (pronghorn, mule deer and moose), songbirds, and raptors, in the desert shrublands west of the Sierra Madre mountain range. Greater sage-grouse (*Centrocercus urophasianus*) populations within the field are also a concern, a



species recently considered by the U.S. Fish and Wildlife Service (USFWS) for the endangered species list and issued a “warranted, but precluded” listing.

### Assemble a working group

A mitigation-design science working group was formed to provide guidance on selection of representative biological targets, designing offsets, and integrating spatial data into the site selection process. These participants (see **Table G-1**) had expertise and involvement with the biological systems that may be impacted by the CD-C development and included representatives from the Wyoming Game and Fish Department (WGFD), Bureau of Land Management (BLM), USFWS, University of Wyoming (UW), biological consulting firms, and the local agricultural production community. The working group helped to provide the most current spatial data for the biological targets, assessed the predictive models being developed, and offered insights into the process being developed. We sought to apply rigorous, objective measures of conservation value whenever possible, recognizing that a quantitative assessment would need to be supplemented by expert opinion. Several meetings were held with members of the working group in 2008 and 2009.

### Compile a list of representative biological targets

Biological diversity cannot easily be completely and directly measured. Thus practitioners are forced to select a set of components of biological diversity that can be measured effectively given existing resources, that adequately represent the range of biological phenomena in the project area, and that contribute the most to overall biological diversity of a project area. We addressed the selection of focal targets that would represent wildlife values on the CD-C field with sufficient breadth and depth by starting with the BLM sensitive species list for the Rawlins Field Office ([http://swccd.us/images/-M\\_WyoBLM\\_Sensitivespecies.pdf](http://swccd.us/images/-M_WyoBLM_Sensitivespecies.pdf)). We also consulted the Wyoming Game and Fish Department’s Species of Greatest Conservation Concern (<http://gf.state.wy.us/wildlife/CompConv-Strategy/SectionI.pdf>) and The Nature Conservancy’s Wyoming Basins Ecoregional Assessment (Freilich et al. 2001). All biological targets from these lists with data demonstrating occurrence within the bounds of the CD-C field area were selected as biological targets to be included in the mitigation planning.

This process resulted in 14 species and 10 systems being selected (**Table G-2**). The targets included three rare plant species—Nelson’s milkvetch (*Astragalus nelsonianus*), Gibben’s beardtongue (*Penstemon gibbensii*) and Persistent sepal yellowcress (*Rorippa calycina*)—all of which have the majority of their known occurrences within the study area (Fertig and Thurston 2003). All ecological systems occurring in the CD-C development area were included as targets and are listed in Table G-2. The eleven selected wildlife species included two amphibians: the northern leopard frog (*Rana pipiens*) and Great Basin spadefoot (*Spea intermontana*). Amphibian breeding habitat is quite rare in the Wyoming basins Ecoregion (Frelitch et al. 2000), meaning that occurrences of these habitats within the development area are particularly important. Crucial winter range and migration corridors were included for mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocarpa americana*). Adversely affecting these critical components of their habitat could lead to population loss—declines have been recently recorded for mule deer populations in the Upper Green River Basin and mule deer have been shown to avoid oil and gas development (Sawyer et al. 2009). The other wildlife species included were the black-footed ferret (*Mustela nigripes*), burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), mountain plover (*Charadrius montanus*), pygmy rabbit (*Brachylagus idahoensis*), and Wyoming pocket gopher (*Spermophilus elegans*).

Wyoming pocket gophers are known only from a small area in south-central Wyoming, and the field may represent a significant portion of their range (Keinath and Beauvais 2006). In general, range-wide it is believed that pygmy rabbit abundance is declining in most known populations (Dobler and Dixon 1990).

## APPENDIX G—COOPERATIVE MITIGATION PLANNING

Information suggests that pygmy rabbit populations can decline rapidly in areas where suitable habitat is altered (Weiss and Vert 1984, Gahr 1993), necessitating additional consideration. Burrowing owls are a neotropical migrant that receives protection under the Migratory Bird Treaty Act and the Convention of International Trade in Endangered Species, and BLM has surface occupancy stipulations for the species (OMBM 1995). While the FWS recognizes the ferruginous hawk as a species of concern (USFWS 1996), it does not give the species any special status under the Endangered Species Act. However, the ferruginous hawk is considered to be declining in several areas, but there is little data available on magnitude of declines (Bechard 1981, Houston and Bechard 1984, Woffinden and Murphy 1989, Ure et al. 1991). Aquatic habitats are of critical importance for wildlife in arid environments and thus all aquatic ecological systems have been identified (playas and riparian wet meadows). Greater sage-grouse (*Centrocercus urophasianus*), previously widespread, have been extirpated from nearly half of their original range in western North America (Schroeder et al. 2004) with a range-wide population decline of 45 – 80 percent and local declines of 17 – 92 percent (Connelly and Braun 1997, Braun 1998, Connelly et al. 2004). Energy development has emerged as a key issue in sage-grouse conservation, as sage-grouse populations appear sensitive to oil and gas development (Holloran 2005, Aldridge and Boyce 2007, Walker et al. 2007).

### Spatial data for biological targets

Spatial data were used to identify biological targets occurring within the CD-C field, as well as occurrence of those targets beyond the field boundary where offsets might be applied. The spatial datasets used to represent each target onsite and offsite are detailed in **Table G-2** and include point survey data, vegetation cover estimates, and predictive model estimates.

In cases where survey data were sufficient for estimating occurrence patterns, we relied on these data. For example, for pronghorn, we utilized pronghorn migration routes from the WGFD (2006). In cases where survey data were insufficient to estimate occurrence patterns across the study area, we used predicted habitat models based on species occurrence, observation, and survey data from the Wyoming Natural Diversity Database (WYNDD), Hayden-Wing Associates (HWA), WGFD, and the BLM. We created predictive habitat models for three species (Great Basin spadefoot, northern leopard frog, and sage-grouse winter habitat) for which existing models were not available, using methods from Kiesecker et al. (2009).

### Offset goals for biological targets

Our intention with this analysis was not to reinvent the EIS process, as there is an extensive literature on this subject (Canter 1996, Sadar et al. 1995); rather we intended to provide an approach that could complement the ongoing EIS. Thus, for this assessment we used a simple approach to quantify field-level impacts and divided the field into four separate units based on the current well-spacing designations (160-acre spacing, 80-acre spacing, 60-acre spacing and 40-acre spacing) approved by the Wyoming Oil and Gas Commission (<http://wogcc.state.wy.us/>). Since companies must actively petition to decrease well spacing below 160-acre spacing, we assumed that these areas have a higher probability of development.

We set mitigation goals on and off the project field area differently. We intersected the spatial data for each of the biological targets with the well-spacing category and calculated the acres (for polygons) and number of occurrences (for points) of each target (**Map G-2, Table G-2**) that would need to be mitigated within these areas.

We examined two possible mitigation scenarios:

1. Where development and associated impacts would be concentrated with the areas designated as 40- and 60-acre well spacing, and set goals based on impacts to those areas. Also, we confined the areas that could serve as potential offset sites within the CD-C project area (**Map G-2**).

2. Development and associated impacts in the area designated as 80-acre spacing, and set goals based on impacts to those areas. Also, the analysis for potential offset sites was expanded to outside the CD-C project area (**Maps F-2 and F-3**).

### **Selecting potential mitigation sites with Marxan**

We used the Marxan (version 1.8.2) site-selection algorithm (Ball and Possingham 2000) to select appropriate locations for potential offset sites within the onsite and offsite project areas. We developed criteria to ensure offsets would mitigate onsite impacts, and ran analyses based on the potential impacts associated with the two scenarios (40- to 60-acre spacing and 80-acre spacing).

Marxan is a siting tool for landscape conservation analysis that explicitly incorporates spatial design criteria into the site-selection process. Marxan operates as a stand-alone program and utilizes an algorithm called “simulated annealing with iterative improvement” as a heuristic method for efficiently selecting regionally representative sets of areas for biodiversity conservation (Possingham et al. 2000). Marxan allows inputs of target occurrences represented as points or polygons in a GIS environment and allows for conservation goals to be stated in a variety of ways, such as percent area or numbers of point occurrences. The program also allows for the integration of spatial data sets representing land use pattern and conservation status, and enables rapid evaluation of alternative configurations or scenarios. The ultimate objective is to minimize the cost of the sites selected (i.e. cost = landscape integrity, conservation cost in dollars, size of the reserve) while still meeting objectives.

The working group selected 100-hectare (approximately 250-acre) hexagons as the unit of analysis for running Marxan, because this was of sufficient spatial resolution to represent biological targets and also large enough to permit efficient analyses across broad landscape scales. The effectiveness of a contiguous set of hexagon units for defining natural variability, especially among spatially heterogeneous data sets, is well documented (White et al. 1992). Each hexagon was populated by summing the area of suitable habitat for the targeted community or species. In addition to the biological information used to select potential offset sites, we incorporated a series of additional rules. First we guided site selection to areas of high biological integrity (as per Copeland et al. 2007). This is equivalent to the “cost” function utilized by Marxan (Ball and Possingham 2000).

### **Results and Discussion**

These results complement the planning and analysis work conducted as part of the CD-C EIS, provides an assessment of biological values that are important at a regional scale, and identifies areas where conservation projects targeted at impacted species may provide a way to offset impacts associated with development.

### **Mapping Sensitive Features**

Our maps and data of sensitive features (**Map G-1**) could be used in a variety of ways to both avoid potential conflicts between development and key wildlife resources on the field and minimize impacts associated with development. For example, impacts to known rare plant occurrences (Nelson milkvetch, Gibbens’ penstemon and persistent sepal yellowcress) should be avoided given their limited distributions and occurrence patterns. Furthermore, predictive habitat species models could be used to guide surveys prior to development. Impacts to rare and/or sensitive animal species (Wyoming pocket gopher, ferruginous hawk, pygmy rabbit, sage-grouse and burrowing owl) should be avoided whenever possible. For sage-grouse this should include both breeding (= leks) and wintering habitat. Aquatic targets (playas, wet meadows, and amphibians, including northern leopard frog and Great Basin spadefoot toad) should also be given special consideration and impacts to any riparian or wetland habitats should be avoided.

### Onsite and Offsite Mitigation Areas

Mitigation sites could be used in a number of ways to compensate for impacts associated with development. A simple approach may be for BLM to establish a surface disturbance (or activity) threshold on a section-by-section basis (or some other spatial unit) and if development exceeds these disturbance caps it would trigger the need to offset the wildlife values within that section. Alternatively, monitoring plots both within development areas and outside development areas could be established for key wildlife targets. Monitoring that reveals departures (declining trends in populations or habitat quality indices) between development and non-development areas could trigger the need for offsets and could be directed at declining species. For this reason we have included an assessment of offset sites and the species/systems they may benefit.

It is important to note that our site-selection exercise did not account for future oil and gas development potential. Prior to establishing these sites for actual mitigation offsets, the development potential should be carefully evaluated and incorporated into the decision-making process.

If offsets are used, a number of criteria will need to be addressed to ensure offsets provide the needed benefit. Critical to their usage will be the demonstration of additional conservation benefits (Kiesecker et al. 2009a) that accrue to impacted wildlife species and systems. Areas selected will only be valuable as offsets if opportunities exist to either restore (i.e. improve conditions for target species) habitat or abate future threats (i.e. prevent invasive weed establishment, conservation easements) to habitat in a manner that improves the condition for target species. Reaching no net loss from impacts associated with development will come from onsite actions that minimize impacts or restore habitat, combined with offsite actions that provide additional benefits. As on-the ground projects are considered, a finer currency that incorporates the size of the impact and offset, as well as values associated with ecological function, quality, and integrity will need to be established (Kiesecker et al. 2009a). For the sagebrush ecosystem, several site assessment tools are available for use (i.e., USFWS 1980, habitat evaluation procedures; USNRCS 1997, ecological site descriptions; Parkes et al. 2003, habitat hectares approach).

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## APPENDIX G—COOPERATIVE MITIGATION PLANNING

**Table G-1. CD-C Mitigation Planning Participants.**

<b>Name</b>	<b>Email</b>	<b>Organization</b>
Michael A. Smith	pearl@uwyo.edu	University of Wyoming
Rhen Etzelmliller	Rhen_Etzelmliller@blm.gov	Bureau of Land Management
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Andy Warren	Andy_Warren@blm.gov	Bureau of Land Management
Cheryl Newberry	Cheryl_Newberry@blm.gov	Bureau of Land Management
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Dick Loper	dloper@wyoming.com	Consultant
Don Schramm	dschramm@wyoming.com	Rock Springs Grazing Board



## APPENDIX G—COOPERATIVE MITIGATION PLANNING

**Table G-2. Biological targets selected for mitigation planning exercise and data source used to represent each target**

Target Name	Onsite	Offsite
Basin Grassland	HWA vegetation map	WY Basins re-GAP vegetation map
Black-footed ferret habitat	BLM potential habitat from prairie dog town maps	BLM potential habitat from prairie dog town maps
Burrowing owl	BLM nest data (not including historical), with 825 ft buffer	BLM nest data (not including historical), with 825 ft buffer
Ferruginous hawk	BLM natural nests, not including historical, with 1/4 mi (1,200 ft) buffer	BLM natural nests, not including historical, with 1/4 mi (1200 ft) buffer
Gibben's beardtongue	WYNDD model (no known locations onsite)	WYNDD model
Greasewood Fans and Flats	HWA vegetation map	WY Basins re-GAP vegetation map
Great Basin spadefoot	BLM/WYNDD occurrences	BLM/WYNDD occurrences
Great Basin spadefoot habitat	National Wetlands Inventory (modeled habitat)	National Wetlands Inventory (modeled habitat)
Juniper Woodland	HWA vegetation map	WY Basins re-GAP vegetation map
Mixed Desert Shrub	HWA vegetation map	WY Basins re-GAP vegetation map
Mountain Big Sagebrush-Mixed Mountain Shrub	HWA vegetation map	WY Basins re-GAP vegetation map
Mountain Plover Habitat	HWA model	WYNDD domain model
Mule deer crucial winter	Wyoming Game and Fish Department (2004)	Wyoming Game and Fish Department (2004)
Mule deer migration corridor	Wyoming Game and Fish Department (2007)	Wyoming Game and Fish Department (2007)
Nelson's milkvetch	WYNDD occurrences	WYNDD occurrences
Nelson's milkvetch habitat	WYNDD habitat model	WYNDD habitat model
Northern leopard frog	BLM/WYNDD occurrences	BLM/WYNDD occurrences
Northern leopard frog habitat	National Wetlands Inventory (modeled habitat)	National Wetlands Inventory (modeled habitat)
Persistent sepal yellowcress	HWA Inventory (Lost Creek polygon)	WYNDD habitat model
Playa	HWA vegetation map	WY Basins re-GAP vegetation map
Pronghorn crucial winter range	Wyoming Game and Fish Department (2004)	Wyoming Game and Fish Department (2004)
Pronghorn migration corridor	Wyoming Game and Fish Department (2007)	Wyoming Game and Fish Department (2007)
Pygmy rabbit	BLM/WYNDD occurrences	BLM/WYNDD occurrences
Pygmy rabbit habitat	WYNDD habitat model (March 2008)	WYNDD habitat model (March 2008)
Riparian-Wet Meadow	HWA vegetation map	WY Basins re-GAP
Sage-grouse breeding areas	BLM/WGFD lek data, with 1/4 mi (1200 ft) buffer	BLM/WGFD lek data, with 1/4 mi (1200 ft) buffer

## APPENDIX G—COOPERATIVE MITIGATION PLANNING

**Table G-2. Biological targets selected for mitigation planning exercise and data source used to represent each target, *continued***

Target Name	Onsite	Offsite
Sage-grouse severe winter range	HWA model (high potential) and known winter locations	TNC habitat model (2009)
Saltbush Fans and Flats	HWA vegetation map	WY Basins re-GAP vegetation map
Vegetated Sand Dunes	HWA vegetation map	WY Basins re-GAP vegetation map
Wyoming Big Sagebrush-Basin Big Sagebrush	HWA vegetation map	WY Basins re-GAP vegetation map
Wyoming pocket gopher	BLM/WYNDD occurrences	BLM/WYNDD occurrences
Wyoming pocket gopher habitat	WYNDD habitat model (Dec 2008)	WYNDD habitat model (Dec 2008)

<sup>1</sup> These acre estimates were used as offset goals for Scenario 1 (40- and 60-acre spacing) and Scenario 2 (80-acre spacing).

**Table G-3. Goals for each of the biological targets by scenario**

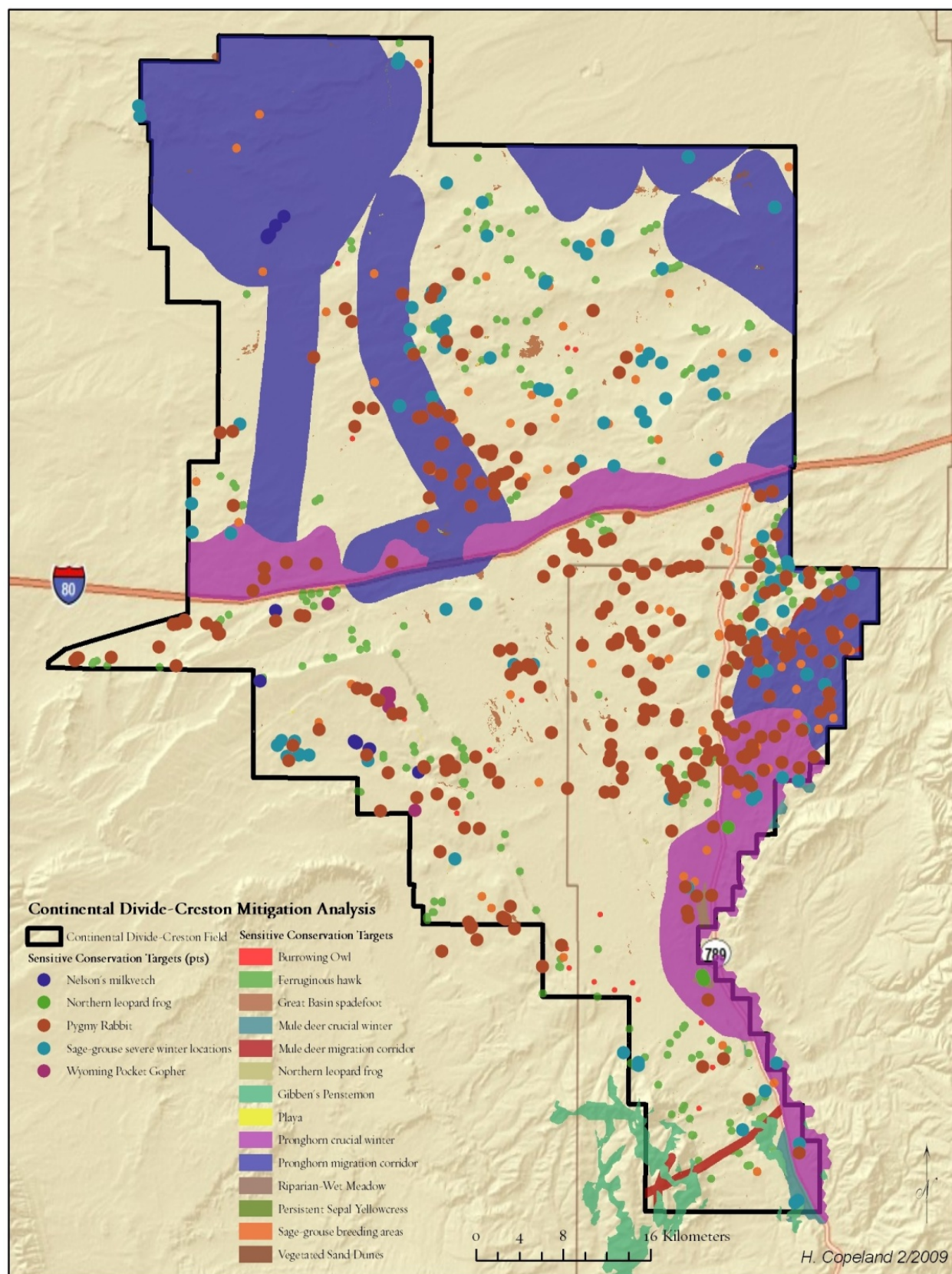
Target Name	Highly Sensitive	Conservation goals within the onsite project area (Scenario 1)	Acres selected onsite by Marxan	Conservation goals within the offsite project area (Scenario 2)	Acres selected offsite by Marxan
Basin Grassland	NO	391	391	1,404	2,141
Black-footed ferret habitat	NO	30,729	23,133	23,955	12,204
Burrowing owl	YES	53	73	328	315
Ferruginous hawk	YES	1,052	1,629	6,964	7,898
Greasewood Fans and Flats	NO	9,725	16,256	42,342	17,953
Great Basin spadefoot habitat	YES	448	741	815	968
Juniper Woodland	NO	0	0	122	794
Mixed Desert Shrub	NO	8,368	9,586	30,970	50,761
Mountain Big Sagebrush-Mixed Mountain Shrub	NO	1,660	4,117	11,456	11,470
Mountain plover habitat	NO	34,911	34,913	77,515	120,812
Mule deer crucial winter	YES	0	189	6,012	35,654
Mule deer migration corridor	YES	0	230	3,550	22,590
Nelson's milkvetch	YES	0	2	0	0
Nelson's milkvetch habitat	NO	0	9,490	15,517	2,837
Northern leopard frog	YES	0	1	1	2
Northern leopard frog habitat	YES	30	35	41	984
Gibben's beardtongue	YES	0	1	2,923	7,579
Playa	YES	3	5	25	3,914
Pronghorn crucial winter	YES	1,492	3,086	21,529	15,311
Pronghorn migration corridor	YES	0	22,245	35,494	35,521
Pygmy rabbit	YES	70	70	163	104
Pygmy rabbit habitat	NO	47,102	67,483	177,295	200,261
Riparian-Wet Meadow	YES	7	109	18	3,102
Persistent sepal yellowcress	YES	0	10	0	14,368
Sage-grouse breeding areas	YES	453	463	1,882	2,519
Sage-grouse severe winter locations	YES	2	13	0	0
Sage-grouse winter habitat	NO	10,536	13,176	38,766	34,105
Saltbush Fans and Flats	NO	17,196	17,189	27,015	27,016
Vegetated Sand Dunes	YES	0	71	35	10,923

## APPENDIX G—COOPERATIVE MITIGATION PLANNING

**Table G-3. Goals for each of the biological targets by scenario, *continued***

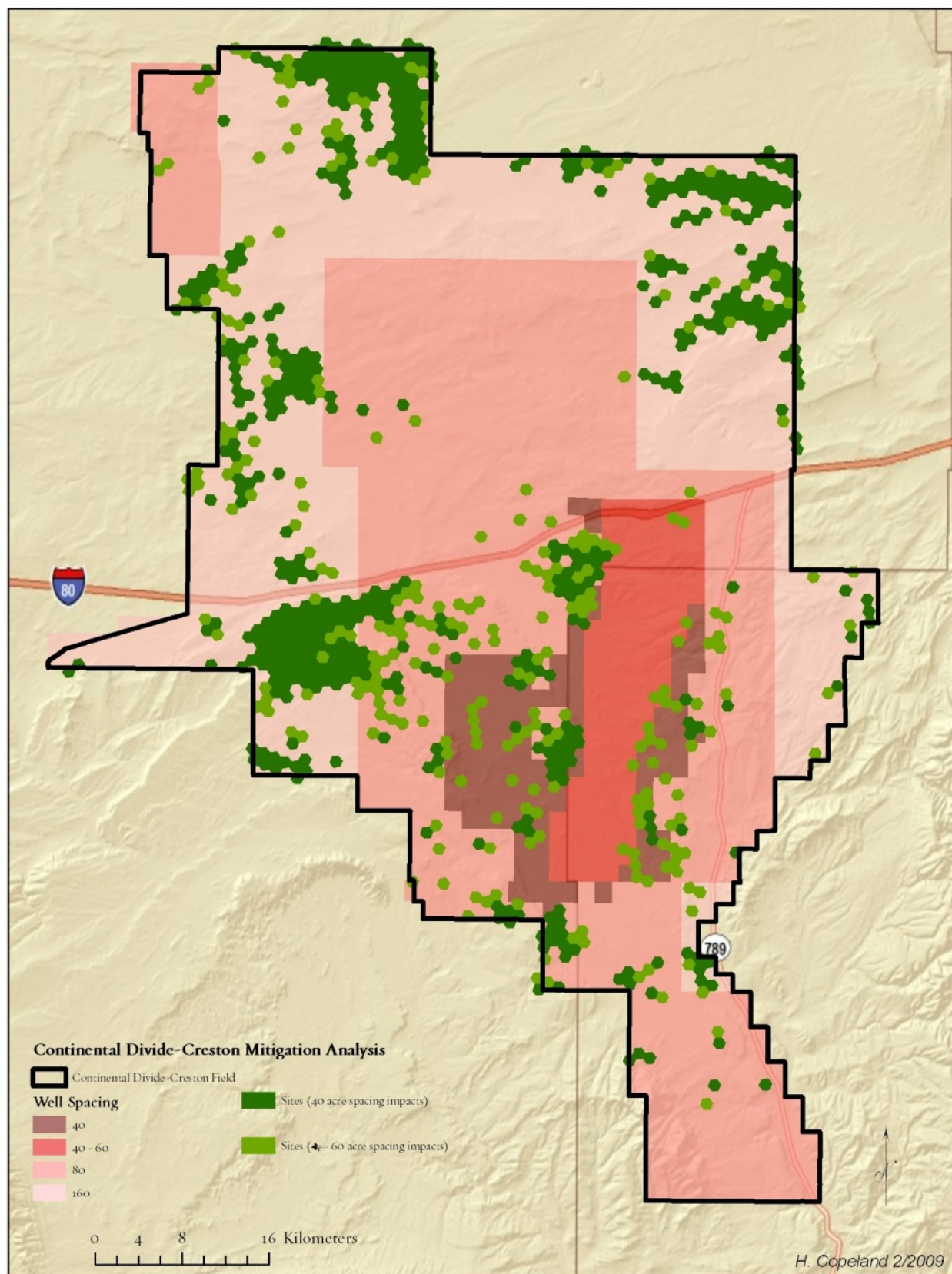
<b>Target Name</b>	<b>Highly Sensitive</b>	<b>Conservation goals within the onsite project area (Scenario 1)</b>	<b>Acres selected onsite by Marxan</b>	<b>Conservation goals within the offsite project area (Scenario 2)</b>	<b>Acres selected offsite by Marxan</b>
Wyoming Big Sagebrush-Basin Big Sagebrush	NO	19,562	23,014	79,127	97,228
Wyoming pocket gopher	YES	0	1	5	1
Wyoming pocket gopher habitat	NO	43,654	43,658	100,754	100,952

## APPENDIX G—COOPERATIVE MITIGATION PLANNING



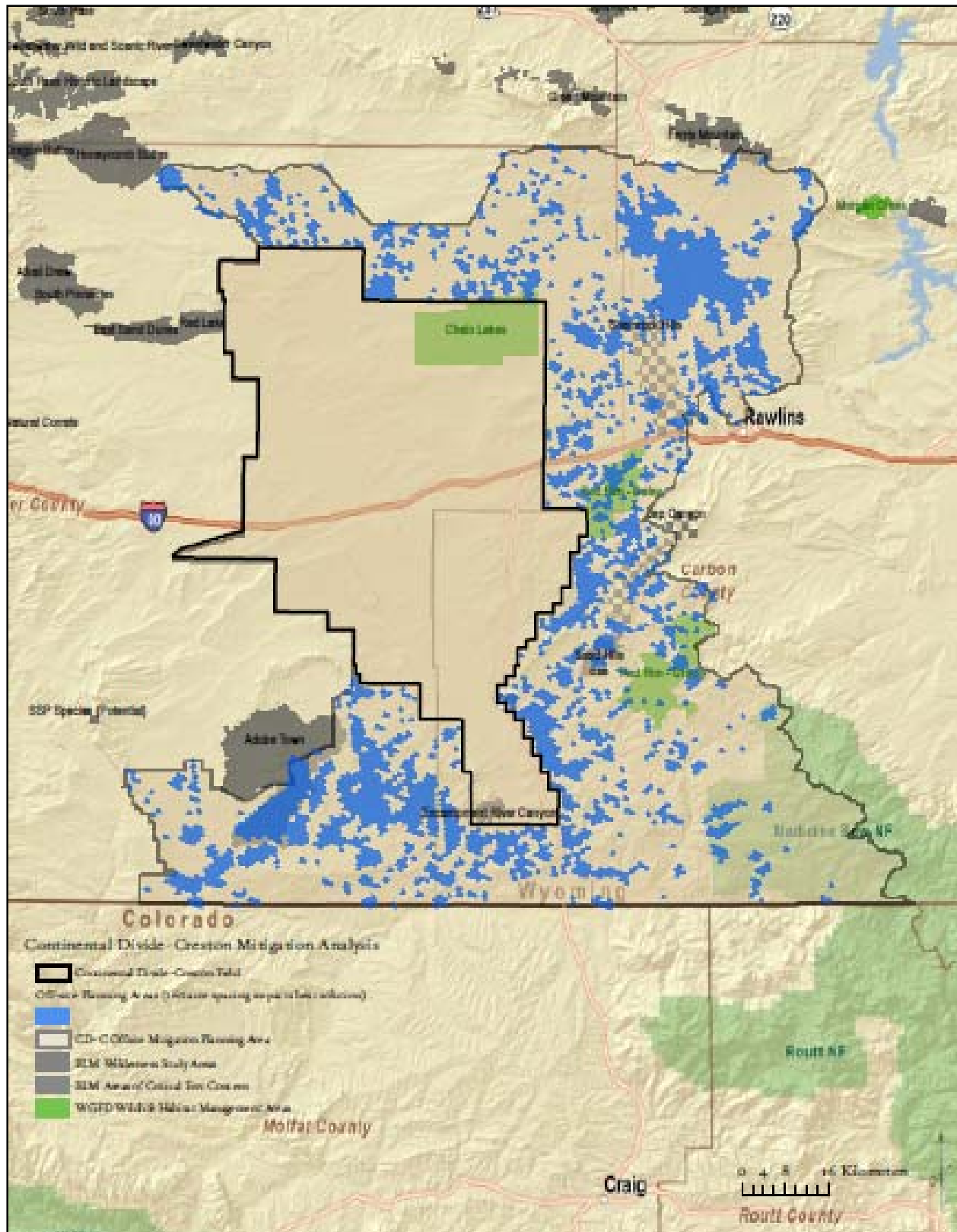
Map G-1. Biological targets with regional importance on the CD-C field.





**Map G-2. Well spacing designations on the CD-C Field and sites selected to offset impacts associated with development scenario 1** (wells concentrated with areas designated as 40- and 60-acre well spacing).

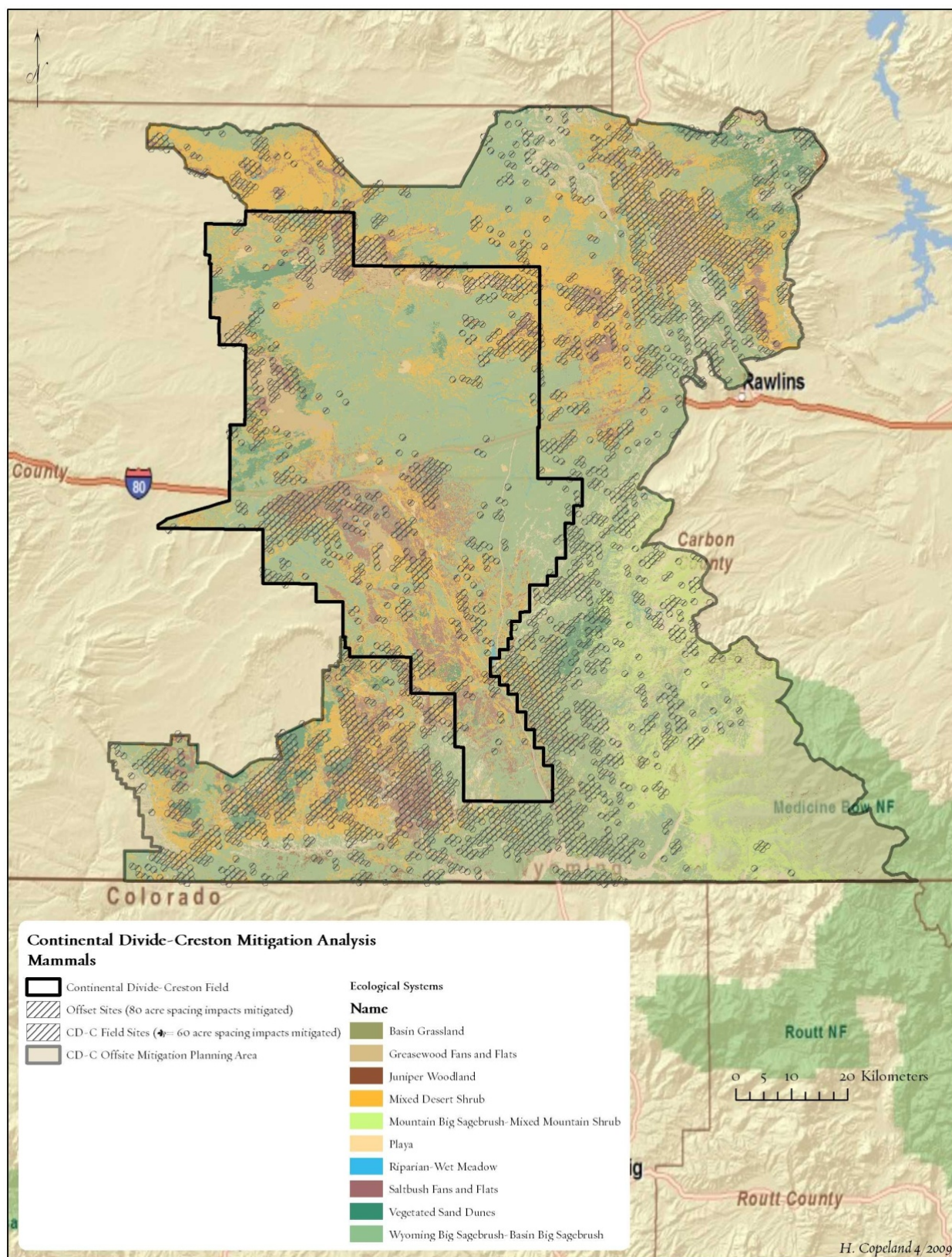
## APPENDIX G—COOPERATIVE MITIGATION PLANNING



**Map G-3. Sites selected outside the project area to offset impacts associated with scenario 2**  
(wells concentrated with areas designated as 80-acre well spacing).



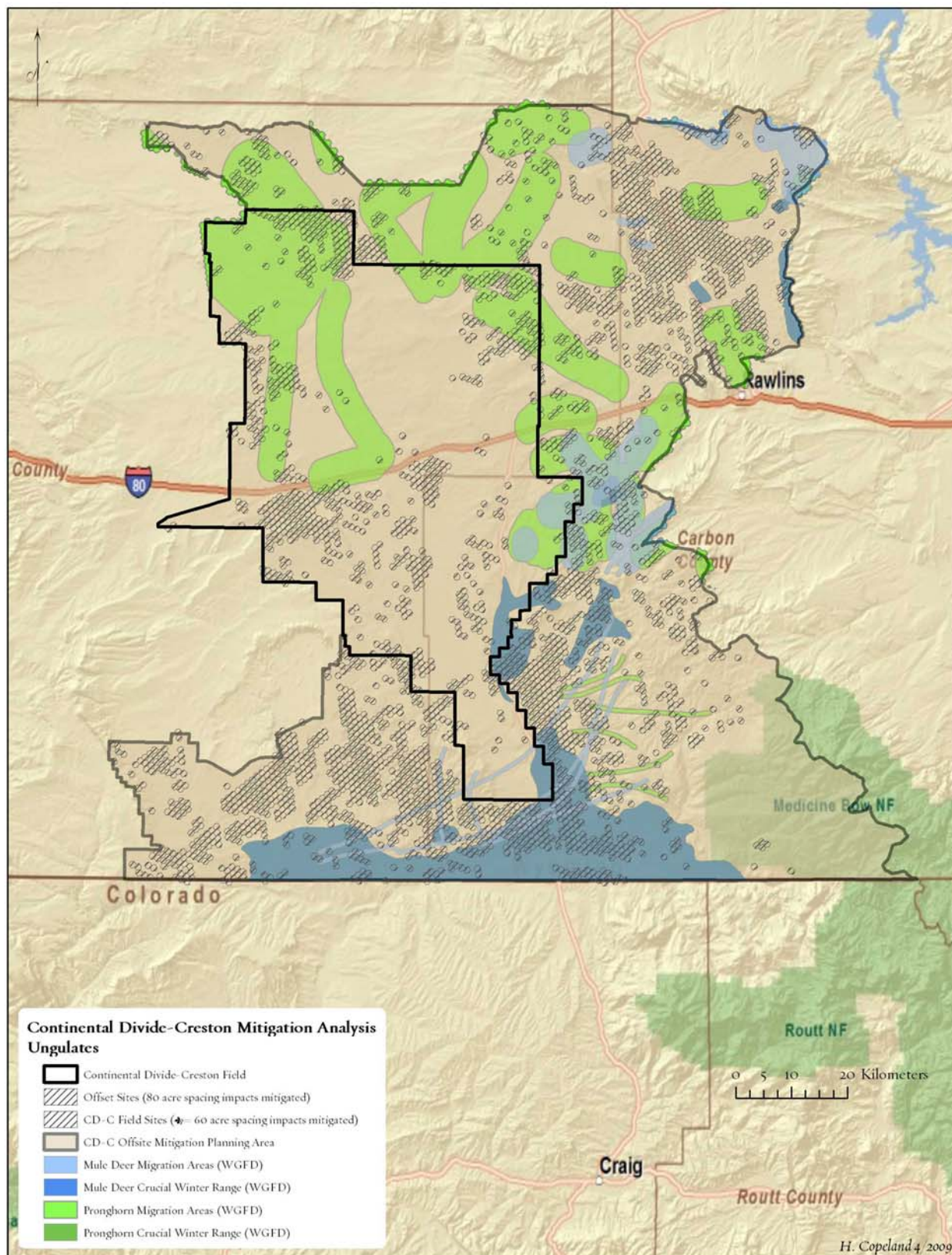
## APPENDIX G—COOPERATIVE MITIGATION PLANNING



Map G-4. CD-C offset site mitigation analysis, mammals



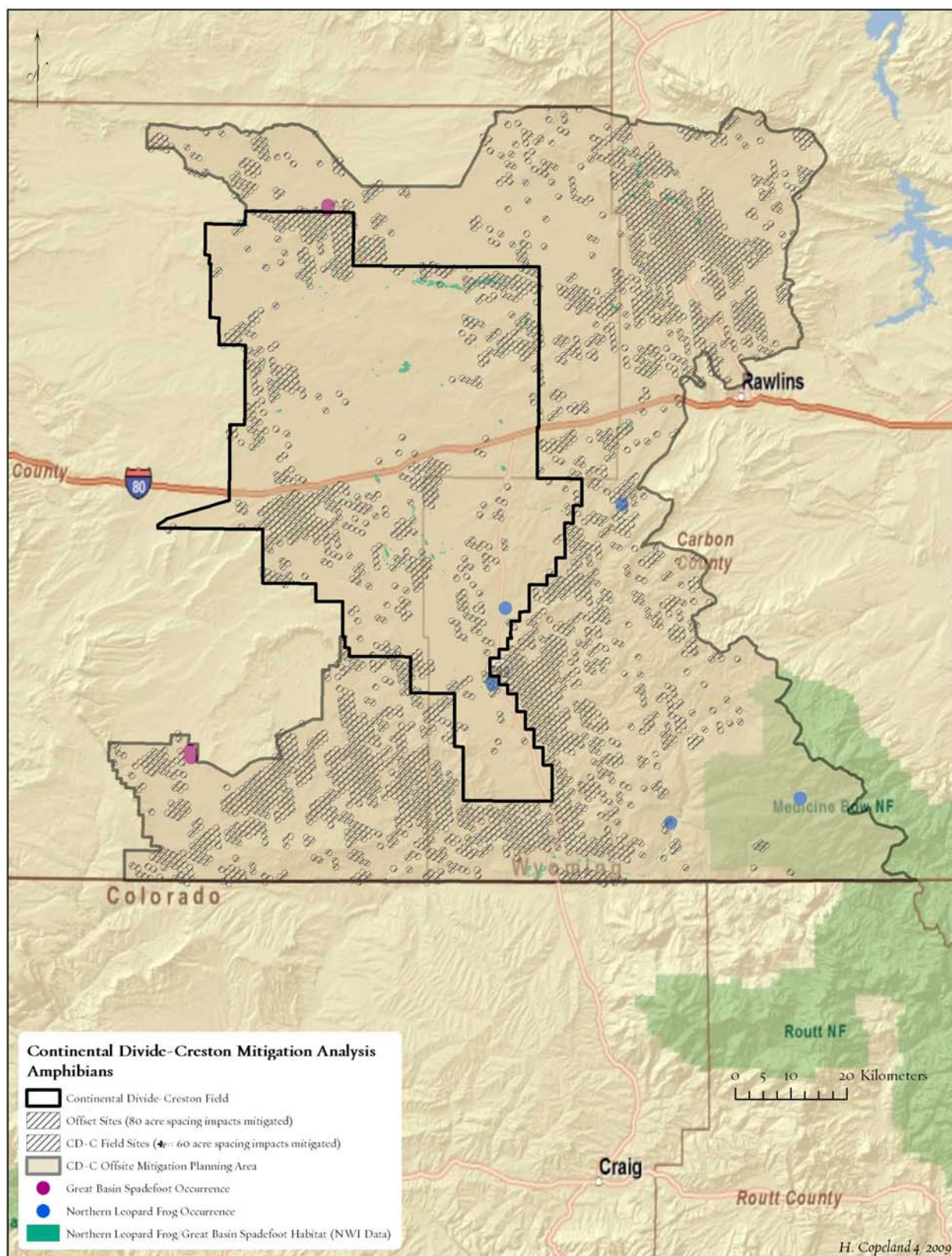
## APPENDIX G—COOPERATIVE MITIGATION PLANNING



Map G-5. CD-C offset site mitigation analysis, ungulates



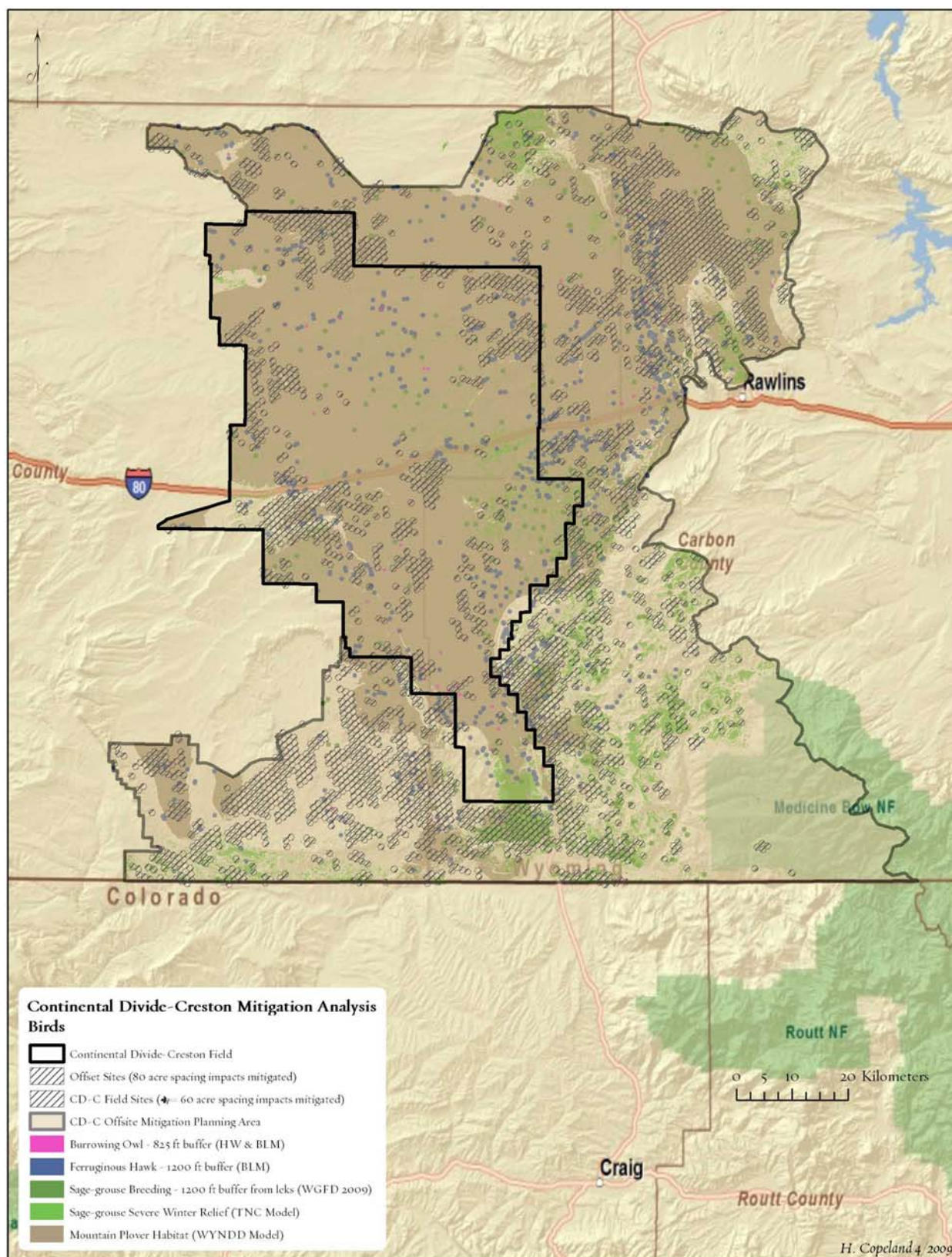
## APPENDIX G—COOPERATIVE MITIGATION PLANNING



Map G-6. CD-C offset site mitigation analysis, amphibians



## APPENDIX G—COOPERATIVE MITIGATION PLANNING



Map G-7. CD-C offset site mitigation analysis, birds

## APPENDIX H: OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C

Common Name: Birds	Scientific Name	Occurrence Potential <sup>1</sup>
Snow Goose	<i>Chen caerulescens</i>	O
Ross's Goose	<i>Chen rossii</i>	O
Canada Goose	<i>Branta canadensis</i>	B
Trumpeter Swan	<i>Cygnus buccinator</i>	O
Tundra Swan	<i>Cygnus columbianus</i>	O
Wood Duck	<i>Aix sponsa</i>	O
Gadwall	<i>Anas strepera</i>	B
American Wigeon	<i>Anas americana</i>	B
Mallard	<i>Anas platyrhynchos</i>	B
Blue-winged Teal	<i>Anas discors</i>	b
Cinnamon Teal	<i>Anas cyanoptera</i>	B
Northern Shoveler	<i>Anas clypeata</i>	B
Northern Pintail	<i>Anas acuta</i>	B
Green-winged Teal	<i>Anas crecca</i>	B
Canvasback	<i>Aythya valisineria</i>	O
Redhead	<i>Aythya americana</i>	B
Ring-necked Duck	<i>Aythya collaris</i>	O
Greater Scaup	<i>Aythya marila</i>	O
Lesser Scaup	<i>Aythya affinis</i>	B
Surf Scoter	<i>Melanitta perspicillata</i>	O
White-winged Scoter	<i>Melanitta fusca</i>	O
Long-tailed Duck	<i>Clangula hyemalis</i>	O
Bufflehead	<i>Bucephala albeola</i>	O
Common Goldeneye	<i>Bucephala clangula</i>	O
Barrow's Goldeneye	<i>Bucephala islandica</i>	O
Hooded Merganser	<i>Lophodytes cucullatus</i>	O
Common Merganser	<i>Mergus merganser</i>	b
Red-breasted Merganser	<i>Mergus serrator</i>	O
Ruddy Duck	<i>Oxyura jamaicensis</i>	O
Greater Sage-Grouse	<i>Centrocercus urophasianus</i>	B
Dusky Grouse	<i>Dendragapus obscurus</i>	B
Columbian Sharp-tailed Grouse	<i>Tympanuchus phasianellus columbianus</i>	B
Pacific Loon	<i>Gavia pacifica</i>	O
Common Loon	<i>Gavia immer</i>	O
Pied-billed Grebe	<i>Podilymbus podiceps</i>	b
Horned Grebe	<i>Podiceps auritus</i>	O
Red-necked Grebe	<i>Podiceps grisegena</i>	O
Eared Grebe	<i>Podiceps nigricollis</i>	B
Western Grebe	<i>Aechmophorus occidentalis</i>	O
Clark's Grebe	<i>Aechmophorus clarkii</i>	O
American White Pelican	<i>Pelecanus erythrorhynchos</i>	O
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	O
American Bittern	<i>Botaurus lentiginosus</i>	O
Great Blue Heron	<i>Ardea herodias</i>	B

# APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA

Common Name: Birds	Scientific Name	Occurrence Potential <sup>1</sup>
Snowy Egret	<i>Egretta thula</i>	O
Cattle Egret	<i>Bubulcus ibis</i>	O
Green Heron	<i>Butorides virescens</i>	O
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	O
White-faced Ibis	<i>Plegadis chihi</i>	O
Turkey Vulture	<i>Cathartes aura</i>	O
Osprey	<i>Pandion haliaetus</i>	BLM
Bald Eagle	<i>Haliaeetus leucocephalus</i>	O
Northern Harrier	<i>Circus cyaneus</i>	B
Sharp-shinned Hawk	<i>Accipiter striatus</i>	b
Cooper's Hawk	<i>Accipiter cooperii</i>	B
Northern Goshawk	<i>Accipiter gentilis</i>	O
Broad-winged Hawk	<i>Buteo platypterus</i>	O
Swainson's Hawk	<i>Buteo swainsoni</i>	B
Red-tailed Hawk	<i>Buteo jamaicensis</i>	B
Ferruginous Hawk	<i>Buteo regalis</i>	B
Rough-legged Hawk	<i>Buteo lagopus</i>	O
Golden Eagle	<i>Aquila chrysaetos</i>	B
American Kestrel	<i>Falco sparverius</i>	B
Merlin	<i>Falco columbarius</i>	O
Peregrine Falcon	<i>Falco peregrinus</i>	O
Prairie Falcon	<i>Falco mexicanus</i>	B
Gyr Falcon	<i>Falco rusticolus</i>	BLM
Virginia Rail	<i>Rallus limicola</i>	b
Sora	<i>Porzana carolina</i>	b
American Coot	<i>Fulica americana</i>	B
Sandhill Crane	<i>Grus canadensis</i>	O
Black-bellied Plover	<i>Pluvialis squatarola</i>	O
Snowy Plover	<i>Charadrius alexandrinus</i>	O
Semipalmated Plover	<i>Charadrius semipalmatus</i>	O
Killdeer	<i>Charadrius vociferus</i>	B
Mountain Plover	<i>Charadrius montanus</i>	B
Black-necked Stilt	<i>Himantopus mexicanus</i>	O
American Avocet	<i>Recurvirostra americana</i>	B
Spotted Sandpiper	<i>Actitis macularius</i>	b
Solitary Sandpiper	<i>Tringa solitaria</i>	O
Greater Yellowlegs	<i>Tringa melanoleuca</i>	O
Willet	<i>Tringa semipalmata</i>	B
Lesser Yellowlegs	<i>Tringa flavipes</i>	O
Whimbrel	<i>Numenius phaeopus</i>	O
Long-billed Curlew	<i>Numenius americanus</i>	O
Marbled Godwit	<i>Limosa fedoa</i>	O
Ruddy Turnstone	<i>Arenaria interpres</i>	O
Red Knot	<i>Calidris canutus</i>	O
Sanderling	<i>Calidris alba</i>	O
Semipalmated Sandpiper	<i>Calidris pusilla</i>	O
Western Sandpiper	<i>Calidris mauri</i>	O

# APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA

Common Name: Birds	Scientific Name	Occurrence Potential <sup>1</sup>
Least Sandpiper	<i>Calidris minutilla</i>	O
Baird's Sandpiper	<i>Calidris bairdii</i>	O
Pectoral Sandpiper	<i>Calidris melanotos</i>	O
Dunlin	<i>Calidris alpina</i>	O
Stilt Sandpiper	<i>Calidris himantopus</i>	O
Buff-breasted Sandpiper	<i>Tryngites subruficollis</i>	O
Short-billed Dowitcher	<i>Limnodromus griseus</i>	O
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	O
Wilson's Snipe	<i>Gallinago delicata</i>	b
Wilson's Phalarope	<i>Phalaropus tricolor</i>	B
Red-necked Phalarope	<i>Phalaropus lobatus</i>	O
Red Phalarope	<i>Phalaropus fulicarius</i>	O
Franklin's Gull	<i>Larus pipixcan</i>	O
Bonaparte's Gull	<i>Larus philadelphia</i>	O
Ring-billed Gull	<i>Larus delawarensis</i>	O
California Gull	<i>Larus californicus</i>	O
Herring Gull	<i>Larus argentatus</i>	O
Sabine's Gull	<i>Xema sabini</i>	O
Caspian Tern	<i>Hydroprogne caspia</i>	O
Common Tern	<i>Sterna hirundo</i>	O
Forster's Tern	<i>Sterna forsteri</i>	O
Black Tern	<i>Chlidonias niger</i>	O
Rock Pigeon	<i>Columba livia</i>	B
White-winged Dove	<i>Zenaida asiatica</i>	O
Mourning Dove	<i>Zenaida macroura</i>	B
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	BLM
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	O
Barn Owl	<i>Tyto alba</i>	O
Great Horned Owl	<i>Bubo virginianus</i>	B
Snowy Owl	<i>Bubo scandiacus</i>	O
Burrowing Owl	<i>Athene cunicularia</i>	B
Long-eared Owl	<i>Asio otus</i>	B
Short-eared Owl	<i>Asio flammeus</i>	b
Northern Pygmy Owl	<i>Glaucidium gnoma</i>	BLM
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	O
Common Nighthawk	<i>Chordeiles minor</i>	B
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	B
White-throated Swift	<i>Aeronautes saxatalis</i>	b
Calliope Hummingbird	<i>Stellula calliope</i>	B
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	O
Rufous Hummingbird	<i>Selasphorus rufus</i>	O
Belted Kingfisher	<i>Ceryle alcyon</i>	B
Lewis's Woodpecker	<i>Melanerpes lewis</i>	O
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	O
Acorn Woodpecker	<i>Melanerpes formicivorus</i>	O
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>	O
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	O

# APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA

Common Name: Birds	Scientific Name	Occurrence Potential <sup>1</sup>
Downy Woodpecker	<i>Picoides pubescens</i>	O
Hairy Woodpecker	<i>Picoides villosus</i>	B
American Three-toed Woodpecker	<i>Picoides dorsalis</i>	O
Northern Flicker	<i>Colaptes auratus</i>	B
Olive-sided Flycatcher	<i>Contopus cooperi</i>	b
Western Wood-Pewee	<i>Contopus sordidulus</i>	O
Willow Flycatcher	<i>Empidonax traillii</i>	O
Least Flycatcher	<i>Empidonax minimus</i>	b
Hammond's Flycatcher	<i>Empidonax hammondii</i>	B
Gray Flycatcher	<i>Empidonax wrightii</i>	b
Dusky Flycatcher	<i>Empidonax oberholseri</i>	b
Cordilleran Flycatcher	<i>Empidonax occidentalis</i>	B
Say's Phoebe	<i>Sayornis saya</i>	B
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	b
Western Kingbird	<i>Tyrannus verticalis</i>	O
Eastern Kingbird	<i>Tyrannus tyrannus</i>	O
Loggerhead Shrike	<i>Lanius ludovicianus</i>	b
Northern Shrike	<i>Lanius excubitor</i>	O
Plumbeous Vireo	<i>Vireo plumbeus</i>	O
Warbling Vireo	<i>Vireo gilvus</i>	b
Philadelphia Vireo	<i>Vireo philadelphicus</i>	b
Red-eyed Vireo	<i>Vireo olivaceus</i>	b
Gray Jay	<i>Perisoreus canadensis</i>	O
Steller's Jay	<i>Cyanocitta stelleri</i>	O
Blue Jay	<i>Cyanocitta cristata</i>	O
Western Scrub-Jay	<i>Aphelocoma californica</i>	b
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>	b
Clark's Nutcracker	<i>Nucifraga columbiana</i>	b
Black-billed Magpie	<i>Pica hudsonia</i>	B
American Crow	<i>Corvus brachyrhynchos</i>	O
Common Raven	<i>Corvus corax</i>	O
Horned Lark	<i>Eremophila alpestris</i>	B
Tree Swallow	<i>Tachycineta bicolor</i>	B
Violet-green Swallow	<i>Tachycineta thalassina</i>	B
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	b
Bank Swallow	<i>Riparia riparia</i>	b
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	B
Barn Swallow	<i>Hirundo rustica</i>	B
Black-capped Chickadee	<i>Poecile atricapillus</i>	B
Mountain Chickadee	<i>Poecile gambeli</i>	b
Juniper Titmouse	<i>Baeolophus ridgwayi</i>	B
Bushtit	<i>Psaltiriparus minimus</i>	b
Red-breasted Nuthatch	<i>Sitta canadensis</i>	B
White-breasted Nuthatch	<i>Sitta carolinensis</i>	O
Brown Creeper	<i>Certhia americana</i>	B
Rock Wren	<i>Salpinctes obsoletus</i>	B
Canyon Wren	<i>Catherpes mexicanus</i>	b

# APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA

Common Name: Birds	Scientific Name	Occurrence Potential <sup>1</sup>
Bewick's Wren	<i>Thryomanes bewickii</i>	B
House Wren	<i>Troglodytes aedon</i>	B
Marsh Wren	<i>Cistothorus palustris</i>	b
American Dipper	<i>Cinclus mexicanus</i>	b
Golden-crowned Kinglet	<i>Regulus satrapa</i>	O
Ruby-crowned Kinglet	<i>Regulus calendula</i>	B
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	b
Western Bluebird	<i>Sialia mexicana</i>	O
Mountain Bluebird	<i>Sialia currucoides</i>	B
Townsend's Solitaire	<i>Myadestes townsendi</i>	b
Veery	<i>Catharus fuscescens</i>	O
Swainson's Thrush	<i>Catharus ustulatus</i>	O
Hermit Thrush	<i>Catharus guttatus</i>	B
American Robin	<i>Turdus migratorius</i>	B
Gray Catbird	<i>Dumetella carolinensis</i>	b
Northern Mockingbird	<i>Mimus polyglottos</i>	O
Sage Thrasher	<i>Oreoscoptes montanus</i>	B
Brown Thrasher	<i>Toxostoma rufum</i>	O
European Starling	<i>Sturnus vulgaris</i>	b
American Pipit	<i>Anthus rubescens</i>	O
Bohemian Waxwing	<i>Bombycilla garrulus</i>	O
Cedar Waxwing	<i>Bombycilla cedrorum</i>	O
Tennessee Warbler	<i>Vermivora peregrina</i>	O
Orange-crowned Warbler	<i>Vermivora celata</i>	B
Nashville Warbler	<i>Vermivora ruficapilla</i>	O
Virginia's Warbler	<i>Vermivora virginiae</i>	O
Yellow Warbler	<i>Dendroica petechia</i>	b
Yellow-rumped Warbler	<i>Dendroica coronata</i>	B
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	b
Townsend's Warbler	<i>Dendroica townsendi</i>	O
Black-and-white Warbler	<i>Mniotilta varia</i>	O
American Redstart	<i>Setophaga ruticilla</i>	O
Ovenbird	<i>Seiurus aurocapilla</i>	O
Northern Waterthrush	<i>Seiurus noveboracensis</i>	O
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	B
Common Yellowthroat	<i>Geothlypis trichas</i>	b
Wilson's Warbler	<i>Wilsonia pusilla</i>	O
Yellow-breasted Chat	<i>Icteria virens</i>	b
Western Tanager	<i>Piranga ludoviciana</i>	b
Green-tailed Towhee	<i>Pipilo chlorurus</i>	B
Spotted Towhee	<i>Pipilo maculatus</i>	b
American Tree Sparrow	<i>Spizella arborea</i>	O
Chipping Sparrow	<i>Spizella passerina</i>	B
Clay-colored Sparrow	<i>Spizella pallida</i>	O
Brewer's Sparrow	<i>Spizella breweri</i>	B
Vesper Sparrow	<i>Poocetes gramineus</i>	B
Lark Sparrow	<i>Chondestes grammacus</i>	b

# APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA

Common Name: Birds	Scientific Name	Occurrence Potential <sup>1</sup>
Black-throated Sparrow	<i>Amphispiza bilineata</i>	O
Sage Sparrow	<i>Amphispiza belli</i>	B
Lark Bunting	<i>Calamospiza melanocorys</i>	B
Savannah Sparrow	<i>Passerculus sandwichensis</i>	b
Baird's Sparrow	<i>Ammodramus bairdii</i>	BLM
Fox Sparrow	<i>Passerella iliaca</i>	O
Song Sparrow	<i>Melospiza melodia</i>	b
Lincoln's Sparrow	<i>Melospiza lincolni</i>	O
Swamp Sparrow	<i>Melospiza georgiana</i>	O
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	b
Dark-eyed Junco	<i>Junco hyemalis</i>	B
McCown's Longspur	<i>Calcarius mccownii</i>	O
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	O
Snow Bunting	<i>Plectrophenax nivalis</i>	O
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	O
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	B
Blue Grosbeak	<i>Passerina caerulea</i>	O
Lazuli Bunting	<i>Passerina amoena</i>	O
Indigo Bunting	<i>Passerina cyanea</i>	O
Bobolink	<i>Dolichonyx oryzivorus</i>	O
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	B
Western Meadowlark	<i>Sturnella neglecta</i>	B
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	B
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	B
Common Grackle	<i>Quiscalus quiscula</i>	O
Brown-headed Cowbird	<i>Molothrus ater</i>	B
Bullock's Oriole	<i>Icterus bullockii</i>	O
Scott's Oriole	<i>Icterus parisorum</i>	b
Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>	O
Black Rosy-Finch	<i>Leucosticte atrata</i>	O
Brown-capped Rosy-Finch	<i>Leucosticte australis</i>	O
Pine Grosbeak	<i>Pinicola enucleator</i>	O
Cassin's Finch	<i>Carpodacus cassinii</i>	B
House Finch	<i>Carpodacus mexicanus</i>	B
Red Crossbill	<i>Loxia curvirostra</i>	O
White-winged Crossbill	<i>Loxia leucoptera</i>	O
Common Redpoll	<i>Carduelis flammea</i>	O
Pine Siskin	<i>Carduelis pinus</i>	b
American Goldfinch	<i>Carduelis tristis</i>	O
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	O
House Sparrow	<i>Passer domesticus</i>	B



# APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA

Common Name: Mammals	Scientific Name	Occurrence Potential
Masked Shrew	<i>Sorex cinereus</i>	B
Merriam's Shrew	<i>Sorex merriami</i>	B
Dusky Shrew	<i>Sorex monticolus</i>	b
Dwarf Shrew	<i>Sorex nanus</i>	B
Water Shrew	<i>Sorex palustris</i>	b
Vagrant Shrew	<i>Sorex vagrans</i>	O
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	O
Long-eared Myotis	<i>Myotis evotis</i>	O
Little Brown Myotis	<i>Myotis lucifugus</i>	O
Fringed Myotis	<i>Myotis thysanodes</i>	O
Long-legged Myotis	<i>Myotis volans</i>	O
Eastern Red Bat	<i>Lasiurus borealis</i>	O
Hoary Bat	<i>Lasiurus cinereus</i>	O
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	O
Big Brown Bat	<i>Eptesicus fuscus</i>	O
Spotted Bat	<i>Euderma maculatum</i>	BLM
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	BLM
Pika	<i>Ochotona princeps</i>	B
Pygmy Rabbit	<i>Brachylagus idahoensis</i>	b
Desert Cottontail	<i>Sylvilagus audubonii</i>	B
Mountain Cottontail	<i>Sylvilagus nutallii</i>	O
Snowshoe Hare	<i>Lepus americanus</i>	B
White-tailed Jackrabbit	<i>Lepus townsendii</i>	B
Yellow-pine Chipmunk	<i>Tamias amoenus</i>	B
Cliff Chipmunk	<i>Tamias dorsalis</i>	b
Least Chipmunk	<i>Tamias minimus</i>	B
Uinta Chipmunk	<i>Tamias umbrinus</i>	B
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	B
Uinta Ground Squirrel	<i>Spermophilus armatus</i>	B
Wyoming Ground Squirrel	<i>Spermophilus elegans</i>	B
Golden-mantled Ground Squirrel	<i>Spermophilus lateralis</i>	B
Spotted Ground Squirrel	<i>Spermophilus spilosoma</i>	B
Thirteen-lined Ground Squirrel	<i>Spermophilus tridecemlineatus</i>	B
White-tailed Prairie Dog	<i>Cynomys leucurus</i>	B
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	BLM
Eastern Fox Squirrel	<i>Sciurus niger</i>	B
Red Squirrel	<i>Sciurus hudsonicus</i>	B
Wyoming Pocket Gopher	<i>Thomomys clusius</i>	B
Northern Pocket Gopher	<i>Thomomys talpoides</i>	b
Olive-backed Pocket Mouse	<i>Perognathus fasciatus</i>	B
Silky Pocket Mouse	<i>Perognathus flavus</i>	b
Great Basin Pocket Mouse	<i>Perognathus parvus</i>	B
Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	B
Beaver	<i>Castor canadensis</i>	B
Deer Mouse	<i>Peromyscus maniculatus</i>	B
Pinyon Mouse	<i>Peromyscus truei</i>	B
Northern Grasshopper Mouse	<i>Onychomys leucogaster</i>	B

**APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA**

<b>Common Name: Mammals</b>	<b>Scientific Name</b>	<b>Occurrence Potential</b>
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	B
Southern Red-backed Vole	<i>Clethrionomys gapperi</i>	B
Western Heather Vole	<i>Phenacomys intermedius</i>	h
Long-tailed Vole	<i>Microtus longicaudus</i>	h
Montane Vole	<i>Microtus montanus</i>	B
Meadow Vole	<i>Microtus pennsylvanicus</i>	B
Sagebrush Vole	<i>Lemmyscus curtatus</i>	B
Muskrat	<i>Ondatra zibethicus</i>	B
Preble's Meadow Jumping Mouse	<i>Zapus hudsonius preblei</i>	BLM
Western Jumping Mouse	<i>Zapus princeps</i>	B
Porcupine	<i>Erethizon dorsatum</i>	B
Coyote	<i>Canis latrans</i>	B
Swift Fox	<i>Vulpes velox</i>	h
Red Fox	<i>Vulpes vulpes</i>	b
Raccoon	<i>Procyon lotor</i>	B
Marten	<i>Martes americana</i>	b
Short-tailed Weasel	<i>Mustela erminea</i>	b
Long-tailed Weasel	<i>Mustela frenata</i>	b
Black-footed Ferret	<i>Mustela nigripes</i>	h
Mink	<i>Mustela vison</i>	b
Badger	<i>Taxidea taxus</i>	B
Striped Skunk	<i>Mephitis mephitis</i>	b
Mountain Lion	<i>Puma concolor</i>	b
Canada Lynx	<i>Lynx canadensis</i>	BLM
Bobcat	<i>Lynx rufus</i>	B
Elk	<i>Cervus elaphus</i>	B
Mule Deer	<i>Odocoileus hemionus</i>	B
White-tailed Deer	<i>Odocoileus virginianus</i>	O
Pronghorn	<i>Antilocapra americana</i>	B
Feral Horse	<i>Equus caballus</i>	B
<b>Common Name: Amphibians</b>	<b>Scientific Name</b>	<b>Occurrence Potential</b>
Tiger Salamander	<i>Ambystoma tigrinum</i>	O
Great Basin Spadefoot	<i>Spea intermontana</i>	O
Boreal Toad	<i>Bufo boreas boreas</i>	O
Wyoming Toad	<i>Bufo baxteri</i>	BLM
Northern Leopard Frog	<i>Rana pipiens</i>	O
Boreal Chorus Frog	<i>Pseudacris maculata</i>	O

## APPENDIX H—OCCURRENCE POTENTIAL OF WILDLIFE IN THE CD-C PROJECT AREA

Common Name: Reptiles	Scientific Name	Occurrence Potential
Ornate Box Turtle	<i>Terrapene ornata ornata</i>	O
Many-lined Skink	<i>Eumeces multivirgatus</i>	H
Northern Sagebrush Lizard	<i>Sceloporus graciosus graciosus</i>	O
Northern Plateau Lizard	<i>Sceloporus undulatus elongatus</i>	O
Greater Short-horned Lizard	<i>Phrynosoma hernandesi</i>	O
Pale Milksnake	<i>Lampropeltis triangulum multistriata</i>	H
Great Basin Gophersnake	<i>Pituophis catenifer deserticola</i>	O
Intermountain Wandering Gartersnake	<i>Thamnophis elegans vagrans</i>	O
Plains Gartersnake	<i>Thamnophis radix</i>	H
Prairie Rattlesnake	<i>Crotalus viridis viridis</i>	O

<sup>1</sup> Occurrence potential of wildlife species includes direct evidence of breeding (B), indirect evidence of breeding (b), record of observation (O), historical record of observation (h), and historical breeding record (H) in the 1-degree grid blocks covering 41 N latitude and 107 W and 108 W longitude (Cervoski et al. 2004). Some species included in the table were not recorded in Cervoski et al. (2004), but were added on the request of the BLM-RFO.

# APPENDIX I: WILDLIFE INVENTORY, MONITORING, AND PROTECTION PLAN

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## 1. INTRODUCTION

This wildlife inventory, monitoring, and protection plan was prepared in conjunction with the Continental Divide-Creston Environmental Impact Statement (CD-C EIS) for the CD-C project area. The BLM is responsible to manage for the biological integrity and habitat function of both terrestrial and aquatic ecosystems within the CD-C project area to sustain and optimize the distribution and abundance of all native, desirable non-native, and Special Status Species (Approved Rawlins Resource Management Plan and Record of Decision [Rawlins RMP] 2008a). The goal of the plan is to avoid and/or minimize adverse impacts to wildlife present on project-affected areas by:

- monitoring wildlife population trends within and adjacent to the CD-C project area during the course of project development and operations,
- developing appropriate mitigation actions, and
- analyzing the effectiveness of the mitigation measures.

Implementation of the plan will provide opportunities for land managers and project personnel to achieve and maintain desired levels of wildlife productivity and populations within and adjacent to the CD-C project area (e.g., at pre-project levels) by minimizing and/or avoiding potential adverse impacts to wildlife species. In addition, the implementation of this plan will facilitate the maintenance of a diverse assemblage of wildlife populations within and adjacent to the CD-C project area simultaneously with development of natural gas reserves.

Proposed inventory, monitoring, protection measures, cause and effect, and adaptive management mitigation will be implemented under the preferred alternative selected for the EIS. Implementation of the plan will begin upon the signing of the Record of Decision (ROD), and is estimated to continue for the life of the EIS. The plan will receive a review for effectiveness by the BLM annually.

## 2. IMPLEMENTATION PROTOCOL

This Wildlife and Plant Inventory/Monitoring, Protection/Adaptive Management, and Analysis Implementation Plan (Plan) contains four (4) basic steps that are required to determine if impacts are occurring to a species, how these impacts are occurring, what mitigation practices are required to reduce and/or remove these impacts, and an analysis to determine if the mitigation practices are effective in removing or reducing these impacts. The basis of the plan follows these four steps:

1. Inventory/monitor species and their associated habitats;
2. Monitor these species to determine changes in population numbers (cause and effect);
3. Identify and implement protection measures if the population shows negative changes; and
4. Analyze the effectiveness of the protection measures, making adjustments if required.

This section provides preliminary information pertaining to the protocols for each of the four steps. The wildlife species/categories for which specific inventory, monitoring, protection, and analysis procedures will be applied were developed based on management agency (Bureau of Land Management [BLM], U.S. Fish and Wildlife Service [USFWS], Wyoming Game and Fish Department [WGFD]) and individual concerns identified during the preparation of the EIS and through discussion at the Monitoring without Borders meetings. Through annual meetings, this Plan identifies methods required to accomplish steps 1-4 for identified species and their associated habitat types based on need, funding, and personnel availability for each upcoming field season and year.

Considerable efforts will be required by agency and Operator personnel for Plan implementation each year. Many of the proposed annual agency data collection activities are consistent with current agency requirements. Additionally, during annual planning (**Section 2.1.2** below) and throughout project implementation, all efforts will be made to accommodate agency personnel schedules and responsibilities.

## APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

In addition, further agency cost-sharing methodologies will be considered such that public demands and statutory directives are achieved.

### 2.1 Annual Reports and Meetings

#### 2.1.1 Reports

Operators will provide the following information, in report format and following the requirements identified in **Table I-1**, to the BLM by November 15 of each calendar year:

1. During project development, Operators will provide an updated inventory/monitoring report and description of all existing project developments (i.e., well pad location, size, roads, and associated level of human activity at each feature), as well as those tentatively proposed for development during the next 12 months in a format that is Geographic Information System (GIS) compatible; and
2. Annual reports will:
  - a. summarize annual wildlife inventory/monitoring
  - b. summarize monitoring results,
  - c. protection measures implemented, and effectiveness of protection measures,
  - d. note any trends across years
  - e. identify and assess protection measures implemented during past years,
  - f. specify monitoring and protection measures proposed for the upcoming year,
  - g. recommend modifications to the existing wildlife monitoring/protection plan based on the successes and/or failures of past years, and
  - h. identify additional species/categories to be monitored.

Where possible, the data presented in reports will be used to identify potential correlations between development and wildlife productivity and/or abundance, as well as sources of potential disturbance to wildlife. GIS will be used for information storage, retrieval, and planning, and annual GIS data updates will be conducted. Raw data collected each year will also be provided to other management agencies, at the request of the agencies. Annual reports will be prepared by the Operators' third-party contractor with BLM oversight.

The BLM will submit a final annual report to all potentially affected individuals and groups by early February of each year. Additional reports may be prepared in any year, as necessary, to comply with other relevant wildlife laws, rules, and regulations.

#### 2.1.2 Meetings

A one-day meeting will be organized by the BLM and held in December (or as determined by the BLM) of each year to discuss and modify, as necessary, proposed wildlife inventory, monitoring, protection protocol, and analysis of protection measures for the subsequent year. Decisions regarding annual Operator-specific financing and personnel requirements will be made at these meetings. A protocol for accommodating previously unidentified development sites will also be determined during the annual meeting. Final decisions will be made by the BLM based on the input of all affected parties. Additional meetings may be required as necessary.

Additional meetings may be held in any given year as necessary to inform and update cooperators on the findings of additional reports.

## 2.2 ANNUAL INVENTORY AND MONITORING

Inventory/monitoring is the process of gathering field data on wildlife distribution, numbers, and/or composition. This includes traditional wildlife range determination and habitat association inventories. It also encompasses population monitoring which is the process of detecting a demographic (e.g., growth rate, recruitment and mortality rates) or distributional change in a population over the course of repeated inventories and relating these changes to either natural processes (e.g., winter severity, predation) or human-related activities (e.g., animal harvesting, mining, forestry, urban development, etc.). Population monitoring may include the development and use of population models that integrate existing demographic information (including harvest) on a species. Inventory/monitoring also includes the process of compiling general (overview) information on the historical and current abundance and distribution of a species, its habitat requirements, rate of population change, and limiting factors (species statistics). Species statistics enable prioritization of animal inventories and population monitoring. All of these activities are included under the term inventory/monitoring (Ministry of Environment, Lands and Parks, November 1998).

Monitoring studies are more site- and problem-specific than inventories. Longer-term monitoring studies better estimate fluctuations in wildlife uses of habitat. Conducting longer-term monitoring of wildlife species is more efficient and accurate for determining how certain land use practices affect wildlife and habitats. Inventories and monitoring procedures are grouped together here because usually the monitoring studies will result from the implementation of the CD-C project and will be based on a combination of these inventory and monitoring results. Monitoring studies involve collecting wildlife and habitat information over time to determine: (1) wildlife use of habitat components; (2) effects of certain land uses (e.g. well pads, roads, human activity in the field) on certain wildlife and habitats; (3) species or habitat changes caused by project implementation, as well as certain natural environmental conditions (e.g., drought); (4) accuracy of predictive models; (5) improvement in the accuracy of predictive models; (6) additional mitigation to protect wildlife and habitat in an area (i.e., from new data, new stipulations may be recommended or required to protect a species and its habitat); and (7) additional habitat improvement to benefit a species or habitat of concern. These actions can determine if the management objectives in the CD-C EIS are being met, can improve a biologist's predictive models (Cooperrider et. al., 1986), and are basically the fundamentals of adaptive management.

The most critical stage of implementing and completing an inventory/monitoring study is not data collection, presentation, or interpretation, but rather design. Years of data can be useless if a study is poorly designed. The use of this Plan, along with the BLM RFO Monitoring without Borders Program, can allow the BLM wildlife biologists to establish a flexible, systematic, and logical approach toward solving wildlife habitat management problems (Cooperrider et. al., 1986) within and adjacent to the CD-C project area. The inventory and monitoring protocols will be as identified below for each wildlife species/category. These protocols will be unchanged, except as authorized by the BLM or specified in this Plan. Additional wildlife species/categories and associated inventories and monitoring protocols may be added or may be omitted in future years, pending species status changes, as well as results presented in the coordinated review of annual reports. Opportunistic wildlife observations may be made throughout the year by agency and Operator personnel present in the project area.

The frequency of inventory and monitoring requirements will be dependent upon the level of development in the project area. In general, frequency will increase with increased levels of development. Monitoring results may lead to further, currently unidentified, scientific studies specifically designed to determine cause and effect. The BLM will identify the level of effort required by this Plan subject to these categories:

- Threatened, Endangered, Candidate, and Proposed Species (Special Status Species) (Plants/Animals) and associated habitats
- BLM Sensitive Species (Plants/Animals) and associated habitats

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- Big Game and associated habitats
- Raptors and associated habitats
- Song birds, waterfowl, and shorebirds and associated habitats
- Amphibians, reptiles, and fish and associated habitats

Although site- and species-specific surveys will be conducted in association with Application for Permit to drill (APD) and right-of-way application field reviews, additional large-scale field work may be required based on need.

### 2.2.1 Special Status Species and Associated Habitat: Inventory and Monitoring Protocols

The BLM is required to conduct Section 7(a) consultation (or conferencing for proposed species) under the Endangered Species Act of 1973 (ESA) with the USFWS if there is the potential for a proposed project to impact any listed species (directly or indirectly) within the CD-C project area. Listed species or proposed species discovered incidentally may require further investigation and consultation (BLM 2011).

The level of inventory and monitoring required for Special Status Species will be commensurate with established protocols for the potentially affected species. Inventory and monitoring surveys for Special Status Species will be conducted by the BLM or a BLM-approved Operator-financed biologist in areas of potential habitat within the CD-C project area and all surveys will be conducted in coordination with the BLM. Methodologies and results of these surveys will be included in annual reports as required in **Table I-1**. A preliminary list of Special Status Species proposed for management and that are known to occur, or have the potential to occur, in the vicinity of the project area is shown in **Table 3.9-3, Chapter 3** of the EIS. As Special Status Species are added to or withdrawn from the USFWS, BLM, and/or WGFD lists, appropriate modifications reflecting these changes will be incorporated into this Plan and specified in annual reports.

Surveys for species or associated habitats will be implemented for the APD and/or right-of-way application processes. If any Special Status Species or habitats are observed, the observations will be noted on appropriate data forms (**Table I-2a**) and efforts will be made to determine species activities (e.g., breeding, nesting, foraging, hunting, etc.). If any management agency identifies a potential for concern regarding any of these species, additional inventory and monitoring and mitigation may be implemented as specified in annual reports.

Special Status Species data collected during surveys and described below will be provided only as necessary to those requiring the data for specific management and/or project development needs. Site- and species-specific Special Status Species surveys will be conducted as necessary in association with all APD and right-of-way application field reviews. It should be noted that the following species or their associated habitats are not known to occur in the CD-C project area; therefore, inventories for these species will not be required at this time: Preble's meadow jumping mouse, yellow-billed cuckoo, Wyoming toad, blowout penstemon plant, and the Colorado butterfly plant. The project is located outside of the North Platte River watershed; therefore there will be no downstream impacts from activities associated with the proposed CD-C project.

**Black-footed Ferret (Endangered).** The USFWS, in coordination with the WGFD, has developed a list of habitat blocks that are not likely to be inhabited by black-footed ferrets (block cleared). In these areas, take of individual ferrets and effects to a wild population are not an issue and surveys for ferrets are no longer recommended. Although ferret surveys are not required in these areas, the area may still maintain value for the survival and recovery of the species in the future. The CD-C project area is located within three Black-footed Ferret Non-Block Cleared Areas (Complexes) which include: (1) the Continental Divide Complex, (2) the Desolation Flats Complex, and (3) the Dad Complex. Individual projects that are located within potential black-footed ferret habitat will require consultation with the BLM and WGFD



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and may require ferret surveys in areas that would likely result in a “take” of a black-footed ferret during project implementation.

BLM biologists will determine the presence/absence of prairie dog colonies at each proposed development site during the APD and right-of-way application field reviews and determine if these colonies meet the requirements for potential black-footed ferret habitat. In the event that a proposed project cannot be relocated, surveys will be conducted as deemed necessary, during consultation with the BLM, WGFD and USFWS. The prairie dog colonies in the project area will be mapped and burrow densities determined, if required, by a BLM-approved Operator-financed biologist in association with the proposed development plan. Colonies that meet USFWS criteria as potential black-footed ferret habitat (USFWS 1989), in non-block cleared areas, will be surveyed for black-footed ferrets by a USFWS-certified Operator-financed surveyor prior to BLM authorizing disturbance of these colonies. Black-footed ferret surveys will be conducted in accordance with USFWS guidelines and approved by BLM and USFWS (**Table I-2a**).

**Greater Sage-Grouse (Candidate).** Greater sage-grouse depend on extensive areas of sagebrush for food and cover and their strutting grounds (leks) are located in open patches with sagebrush habitat. Grouse exhibit site fidelity to leks, winter and summer areas. Greater sage-grouse breeding grounds (leks) inventories will be conducted by the BLM and WGFD within and adjacent to the project area to determine lek locations as deemed appropriate by the BLM. These surveys will use the WGFD protocol (**Table I-2a**). Surveys may be conducted aerially, with Operator-provided financial assistance for aircraft rental, based on funding availability, or on the ground, in order to determine lek locations and will follow the protocols identified in Table I-2a.

Selected leks, identified by the BLM, will be monitored annually to determine lek attendance by the BLM or a BLM-approved Operator-financed biologist, in coordination with the WGFD and using the WGFD protocol (**Table I-2a**). Monitoring will occur between March 1 and May 15, such that all leks within the CD-C project area are monitored at least once every 3 years. Population trend analysis may also be required and will be completed with a suitable nearby reference area. The BLM will direct lek monitoring efforts such that efforts are made to have the same individuals monitor the same leks within and across years. Data collected during these surveys will be provided on a standardized form (Table I-2a).

Helicopter surveys for wintering areas will occur when weather conditions provide the best opportunity for these types of surveys and will be scheduled between December 15 and February 30. These winter surveys should be flown at about 25 – 50 meters above ground at ¼-mile intervals. These surveys are designed to visually identify sage-grouse and/or their tracks (BLM 2011).

**Ute Ladies'-Tresses Plant (Threatened).** The Ute ladies'-tresses plant is located in riparian and wetland habitats between 4,300-7,000 feet in elevation. This species is not known to occur within the project area and the likelihood of occurrence is low; however, there is the potential of occurrence according to the USFWS. Locations of potential Ute ladies'-tresses plants within the CD-C project area will be mapped using the latest available aerial imagery, land use/land cover data (GAP and Landsat), and ground-truthing. This habitat information will be digitized into a GIS format and may be used to guide surveys for this threatened plant at the appropriate time of year (**Table I-2a**).

**Colorado River Species (Endangered).** The BLM is required to conduct Section 7(a) consultation with the USFWS for water depletions from the Colorado River Basin. It has been determined that upstream water depletions from this system may have a detrimental impact on four listed fish species and their Critical Habitat downstream. Depletions represent an annual reduction in the volume of stream flow that would have reached the Critical Habitat of the four endangered fish species residing in the Colorado River Basin. The water depletion determination form is located in **Table I-2a**.

## 2.2.2 BLM Wyoming State Sensitive Species (Plants/Animals) and Associated Habitats, Inventory and Monitoring Protocols

BLM Sensitive Species are species designated internally in accordance with BLM Manual 6840 (BLM 2008b). The document states: “*Actions authorized by the BLM shall further the conservation/recovery of federally listed species and conservation of Bureau sensitive species. Bureau sensitive species will be managed consistent with species and habitat management objectives in land use plans...to promote their conservation and to minimize the likelihood and need for listing under the ESA.*”

Surveys to inventory and monitor BLM Wyoming State Sensitive Species (BLM Sensitive Species) will be conducted by the BLM or a BLM-approved Operator-financed biologist in areas of potential habitat within the CD-C project area. Information on the habitats and use of the project area is required and sources of this information include the BLM, Wyoming Natural Diversity Database (WYNDD), the WGFD, and the USFWS. In addition, surveys for site-specific species or associated habitats will be implemented at the APD and/or right-of-way application processes. If any BLM Sensitive Species or habitats are observed, the observations will be noted on appropriate data forms (**Table I-2a**) and efforts will be made to determine their activities (e.g., breeding, nesting, foraging, hunting, etc.). If any management agency identifies a potential for concern regarding any of these species, additional inventory, monitoring, and mitigation may be implemented as specified in annual reports.

### 2.2.2.1 BLM Sensitive Small Mammals and Associated Habitats

The long-eared myotis, fringed myotis, spotted bat, Townsend’s big-eared bat, pygmy rabbit, Wyoming pocket gopher, and white-tailed prairie dog have been identified as BLM Sensitive Species in the RFO and have the potential to occur within the CD-C project area. The swift fox and black-tailed prairie dog are also identified as BLM Sensitive Species in the RFO; however, they are not expected to occur within the CD-C project area.

**Bat Species (long-eared myotis, fringed myotis, spotted bat, Townsend’s big-eared bat).** Long-eared myotis, fringed myotis, spotted bats and Townsend’s big-eared bats inhabit conifer and deciduous forests, caves and mines, rock crevices, man-made structures and shrublands and have been observed within the CD-C project area. These bats could be both resident and migratory within the project area and utilize the project area for feeding; however, hibernation is unlikely because suitable habitat is limited. Inventory and monitoring specifically for bat species within the CD-C project area has not occurred; therefore, impacts to these species as a result of implementing the Proposed Action within the CD-C project area are not known. Acoustic bat surveys, bat carcass surveys, radar surveys and mist netting surveys are four (4) potential inventory and monitoring techniques that could be used to identify where bat species are present within the project area and potential impacts to these species. There is limited information pertaining to impacts to bat species as a result of natural gas drilling (**Table I-2a**).

**Pygmy Rabbit.** Pygmy rabbits are a sagebrush obligate and occur in basin prairie and riparian shrub and tall sagebrush in dense patches with sandy and loose soils. These rabbits are known to occur within the CD-C project area. The inventory and monitoring protocol for this species is identified in **Table I-2a**.

**Wyoming Pocket Gopher.** The Wyoming pocket gopher occurs in side-hills and ridge-tops, in cushion-plant communities within otherwise sagebrush-grasslands habitat. The species has the potential to occur within the CD-C project area. The inventory and monitoring protocol for this species is identified in **Table I-2a**. During 2009 interagency/industry survey efforts in the RFO followed WYNDD’s protocol of trapping for three consecutive nights or until a pocket gopher was captured. Trapping procedures need to consider the following: allowing trapping during the day (within reason) dependent on forecasted high temperatures, since pocket gophers are just as likely to backfill during the day as they are at night; and limiting the number of trap nights per location, as some gophers can be extremely difficult to capture or their burrows may become inactive over a period of time (i.e., dispersal) rendering trapping unproductive.

**White-Tailed Prairie Dog.** The white-tailed prairie dog inhabits sagebrush-grasslands and is located within the project area.

#### 2.2.2.2 BLM Sensitive Upland Game Birds, Migratory Raptors, Songbirds, Shorebirds, Waterfowl and Habitats

The loggerhead shrike, sage thrasher, Brewer's sparrow, sage sparrow, white-faced ibis, trumpeter swan, long-billed curlew, bald eagle, ferruginous hawk, mountain plover, and burrowing owl species have been identified as BLM Sensitive Species in the RFO and have the potential to occur within the CD-C project area. These species have the potential to occur in the following habitats:

- Loggerhead shrike, sage thrasher, Brewer's sparrow, and sage sparrow occur within basin/prairie shrub and mountain foothills shrub habitats, sagebrush and are sagebrush obligate species.
- White-faced ibis inhabits marshes and wet meadows.
- Trumpeter swan inhabits lakes, ponds, and rivers.
- Long-billed curlew inhabits grasslands, plains, foothills and wet meadows.
- Bald eagle inhabits large rivers, streams and lakes, but have been observed in the project area primarily from November through March, forages on winter carrion and the nearest potential nesting habitat is along the Little Snake River nine miles south of the project area.
- Ferruginous hawk inhabits sagebrush-grasslands and has been found in the project area.
- Mountain plover inhabits grasslands and has been found within the project area.
- Burrowing owl has been observed in sagebrush-grasslands in the project area and has a close association with burrowing mammals such as prairie dogs, ground squirrels, and badgers.

The following species are also identified as BLM Sensitive Species in the RFO; however, they are not expected to occur within the CD-C project area: Baird's sparrow, Columbian sharp-tailed grouse, northern goshawk, and peregrine falcon.

The BLM has responsibilities under the Migratory Bird Treaty Act (MBTA) to analyze and protect all migratory birds. Most of North America's birds are migratory and migrate during the night, usually at higher altitudes when weather conditions are favorable. Songbirds are vulnerable to colliding with man-made structures such as buildings, communication towers, power-poles or even wind turbines during poor weather conditions that force them to lower altitudes (BLM 2011).

Bird surveys are required to estimate the temporal and spatial use of the CD-C project area and vicinity by birds. Fixed-point count surveys can be used as a tool to inventory for songbird, raptor and other groups of birds. Radar surveys using marine radar surveillance can also be used to determine avian species flight patterns in the project area (i.e. foraging movements and migration). Multiple sampling locations should be identified within the selected study areas and surveyed in consultation with the BLM and WGFD (Table I-2a).

**Songbirds (loggerhead shrike, sage thrasher, Brewer's sparrow, sage sparrow).** Bird surveys are required to estimate the temporal and spatial use of the CD-C project area and vicinity by these four BLM Sensitive bird species. Fixed-point count surveys can be used as a tool to inventory for these birds. Radar surveys using marine radar surveillance can also be used to determine their flight patterns in the project area (i.e. foraging movements and migration). Multiple sampling locations should be identified within the selected study areas and surveyed in consultation with the BLM and WGFD (Table I-2a).

**Shorebirds (white-faced ibis, long-billed curlew).** Ground surveys can be used during the breeding season, mitigation season (migratory) and the non-breeding season (winter) to determine species numbers. Aerial surveys and four-wheelers can be used for inaccessible areas (Table I-2a).

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**Waterfowl (trumpeter swan).** In the event that surveys are required, aerial surveys in the fall and mid-winter will be conducted. Ground surveys can be used for areas that are inaccessible. Ground surveys are used to verify species composition of some swan flocks. The primary purpose of these surveys is to document the size of the U.S. trumpeter swan flocks and to enumerate the annual production of cygnets to fledgling age. The survey also provides some information on territorial occupancy and the distribution of failed breeders and non-breeders from year to year (USFWS 2011).

**Bald Eagle.** When bald eagles are located within a proposed project area, then surveys are required that include nest and production surveys, winter use surveys, and eagle flight patterns and use of the project area throughout all phases of the project. In addition, analysis or mitigation measures necessary to comply with the Bald and Golden Eagle Protection Act are required by the BLM in coordination with the USFWS (BLM 2011). The CD-C project area does not have any known nesting habitat for bald eagles; however, bald eagles may fly over the area and feed in the area during certain times of the year, especially winter.

Marine surveillance radar may be required to determine eagle flight patterns in the CD-C project area (i.e. foraging movements and migration). Multiple sampling locations should be identified within the area and surveyed in consultation with the BLM. In addition, telemetry studies (radio or satellite) may be required to determine eagle flight patterns in the CD-C project area (BLM 2011)

**Ferruginous Hawk.** Ferruginous hawks are found in mixed-grass prairie and sagebrush steppe habitats during the spring, summer, and fall and generally build nests on rock outcrops, the ground, and cliff ledges.

Ferruginous hawk surveys are required to: (1) identify nest densities occurring within the CD-C project area and (2) record nest locations to identify areas with a potential increased risk of disturbance or collisions for adults or young associated with nest sites (BLM 2011). Ferruginous hawk inventories will be conducted by the BLM at least every five years (as identified in annual reports), to determine the location of new nests, based on funding availability. These surveys may be implemented aerially, via helicopter, or from the ground. Operators may provide financial assistance for aircraft rental, based on funding availability.

Breeding and nesting monitoring will be conducted annually between April and July at known nest locations by the BLM or a BLM-approved Operator-financed biologist, in order to ascertain nest activity status. Monitoring generally will be conducted from the ground, and attempts will be made to determine the cause of any documented nest failure. Operators may provide financial assistance for aircraft rental, as necessary. Site- and species-specific ferruginous hawk nest inventories will be conducted as necessary in association with all APD and right-of-way application field reviews.

All nest/productivity surveys will be conducted using procedures that minimize potential adverse effects to nesting ferruginous hawks. Specific survey measures for reducing detrimental effects are listed in Grier and Fyfe (1987) and Call (1978) and include the following:

- a. Nest visits will be delayed for as long as possible in the nesting season;
- b. Nests will be approached cautiously, and their status (e.g., nestlings/fledglings) will be determined from a distance with binoculars/scope;
- c. Nests will be approached tangentially and in an obvious manner to avoid startling adults;
- d. Nests will not be visited during adverse weather conditions (e.g., precipitation events, windy periods, and the hottest part of the day);
- e. Visits will be kept as brief as possible;
- f. All inventories will be coordinated by the BLM;
- g. The number of nest visits in any year will be kept to a minimum; and
- h. All raptor nest location data will be considered confidential.

**Mountain Plover.** Mountain plover breeding habitat includes short-grass prairie and shrub-steppe landscapes, dry land, cultivated farms, and are frequently associated with prairie dog towns. Plovers usually nest on sites where vegetation is sparse or absent; conditions that can be created by herbivores, including domestic livestock and prairie dogs. Vegetation in shortgrass prairie sites is typically less than 4 inches tall. Nest sites within the shrub-steppe landscape are also confined to areas with little to no vegetation, although surrounded by areas visually dominated by shrubs. Commonly, nest sites within shrub-steppe areas are on active prairie dog towns. Nests are commonly located near a manure pile or rock. In addition to areas disturbed by prairie dogs or livestock, nests have also been found on bare ground created by oil and gas development activities and on dryland, cultivated agriculture in the southern part of their breeding range. Mountain plovers are rarely found near water. Positive indicators for mountain plovers therefore include level terrain, prairie dogs, bare ground, cactus pads, cattle, widely spaced plants, and horned larks. It would be unusual to find mountain plovers on sites characterized by irregular or rolling terrain, dense, matted vegetation, grass taller than 4 inches, wet soils, or the presence of killdeer.

Mountain plover habitat within the CD-C EIS has been mapped within the project area; however, standard site-specific habitat surveys will be conducted as necessary in association with all APD and right-of-way application field reviews. Surveys, if required, will be conducted by the BLM or a BLM-approved Operator-financed biologist to detect the presence of plovers. Surveys will generally be conducted during the period of April 24 through May 10 to determine presence/absence of mountain plovers and June 25 through July 10 to determine density of nesting mountain plovers (**Table I-2a**). These dates may change after consultation with the USFWS and WGFD.

**Burrowing Owl.** Burrowing owls are commonly found in prairie dog towns, are migratory, breed throughout the plains and prairies of the western United States and winter in the southern United States and throughout Mexico. Federal and state laws prohibit the harming and killing of burrowing owls and the destruction of active nests.

Prairie dog colonies and other suitable burrowing owl nesting areas on and within 0.75 miles of existing and proposed disturbance areas will be searched for western burrowing owls by the BLM from April 15 through September 15 to determine the presence or absence of nesting owls within the CD-C project area (BLM 2011). If burrowing owls are found, attempts will be made to determine reproductive success. In addition, standard site-specific surveys will be conducted in association with all APD and right-of-way application field reviews.

### **2.2.2.3 BLM Sensitive Amphibians, Reptiles, and Fish Species and Associated Habitats**

The northern leopard frog, Great Basin spadefoot toad, Colorado River cutthroat trout, roundtail chub, flannelmouth sucker, and bluehead sucker have been identified as BLM Sensitive Species in the RFO and have the potential to occur within the CD-C project area. The Western boreal toad and hornyhead chub are also identified as BLM Sensitive Species in the RFO; however, they are not expected to occur within the CD-C project area.

There are no sensitive reptile species identified in the CD-C project area at this time. If species are identified in the future, then presence/absence surveys and hibernacula/maternity den site searches will be required in sensitive reptile habitat (BLM 2011) at the CD-C project area and site-specific APD and/or right-of-way level.

**Northern Leopard Frog and Great Basin Spadefoot Toad.** Habitat mapping, Acoustic Breeding Surveys, and Visual Encounter Surveys (**Table I-2a**) can be used to determine if the northern leopard frog and Great Basin Spadefoot species are present within the CD-C project area and at the APD and/or right-of-way application process.

**Colorado River Cutthroat Trout, Roundtail Chub, Flannelmouth Sucker, and Bluehead Sucker.** At this time, the fish species inventory in the CD-C project area has been completed. BLM sensitive fish species population monitoring will continue to be conducted by the WGFD and the BLM. Monitoring for the associated habitats for sensitive fish species will be required and may include channel morphology, water quality, and in-stream habitat.

#### 2.2.2.4 BLM Sensitive Plant Species and Associated Habitats

The meadow milkvetch, Cedar Rim thistle, Gibbens' beardtongue, and persistent sepal yellowcress plants have been identified as BLM Sensitive Species in the RFO and have the potential to occur within the CD-C project area. The many-stemmed spider flower, Laramie columbine, dune wild rye, Laramie false sagebrush, and limber pine are also identified as BLM Sensitive Plant Species in the RFO; however, they are not expected to occur within the CD-C project area.

Locations for BLM Sensitive Plant Species within the CD-C project area will be mapped using the best available data from WYND modeling and ground-truthing. This habitat information will be digitized into a GIS format and may be used to guide these plant surveys at the appropriate time of the year (BLM 2011).

**Meadow Milkvetch, Cedar Rim Thistle, Gibbens' Beardtongue, and Persistent Sepal Yellowcress Plants.** Sensitive plant surveys will be required within the CD-C project area. In addition, surveys for site-specific species or associated habitats will be implemented at the APD and/or right-of-way application processes to determine the potential to affect these plant species (Table I-2a).

#### 2.2.3 Big Game and Associated Habitats

Data on big game use of crucial winter ranges and migration corridors within and adjacent to the project area will be requested by the BLM from the WGFD, as deemed necessary by the BLM. Surveys are required to fully understand the big game use in the project area and the associated impacts that may occur (BLM 2011). This information will be used to assess the effectiveness of protection measures implemented for the project. In the event that BLM, in consultation with the WGFD and other interested parties, determines that additional data should be collected for big game, these issues will be discussed at the annual meeting.

**Big Game Crucial Winter Range.** A radio or satellite telemetry study will be developed in cooperation between the BLM and WGFD to monitor the use of big game crucial winter range within the CD-C project area. In addition, Pellet Count Surveys can be used to evaluate the seasonal spatial distribution of big game species based on the presence of pellet groups.

Shrub age can be an important aspect, within mule deer habitat, often indicating that older-aged plants are more typical with most inventory and monitoring studies. Older plants typically produce leaders with greater lignin, greater secondary compounds which limit digestibility and less vigor. Current research in various locations (e.g., Colorado, Idaho, Nevada, Utah) have identified nutrition as an aspect currently limiting mule deer's ability to increase in numbers. This occurs in both winter ranges as well as transitional ranges for mule deer (BLM JIO-PAPO, 2012).

**Big Game Migration Corridors.** A radio or satellite telemetry study will be developed in cooperation between the BLM and WGFD to determine movement of big game and potential migration corridors within the CD-C project area.

#### 2.2.4 Raptors and Associated Habitats

Raptor surveys are required to: (1) identify the species and nest densities occurring within the CD-C project area and (2) record raptor nest locations to identify areas with a potential increased risk of disturbance or collisions for adults or young associated with nest sites (BLM 2011). Raptor inventories

will be conducted by the BLM at least every five years (as identified in annual reports), to determine the location of new raptor nests, based on funding availability. These surveys may be implemented aerially, via helicopter, or from the ground. Operators may provide financial assistance for aircraft rental, based on funding availability.

Breeding and nesting monitoring will be conducted by the BLM or a BLM-approved Operator-financed biologist, annually, at known nest locations, between February and August, in order to ascertain nest activity status. Monitoring generally will be conducted from the ground, and attempts will be made to determine the cause of any documented nest failure. Operators may provide financial assistance for aircraft rental, as necessary. Site- and species-specific raptor nest inventories will be conducted as necessary in association with all APD and right-of-way application field reviews.

All raptor nest/productivity surveys will be conducted using procedures that minimize potential adverse effects to nesting raptors. Specific survey measures for reducing detrimental effects are listed in Grier and Fyfe (1987) and Call (1978) and are located in **Section 2.2.2.2, Inventory/Monitoring Protocol for Ferruginous Hawks**.

Winter use raptor surveys are required to (1) identify the species and winter densities occurring within the CD-C project area and (2) record raptor hunting use areas with a potential increased risk of disturbance or collisions for raptors to predict potential impacts. Suitable raptor perch sites such as cliffs, rock outcrops, man-made structures, tree tops, and areas of relatively high prey densities should be searched for hunting raptors. Helicopters can be used for these surveys; however, care should be taken to minimize disturbance to raptors during surveys (BLM 2011).

### **2.2.5 Songbirds, Waterfowl, and Shorebirds and Associated Habitats**

The BLM has responsibilities under the MBTA to analyze and protect all migratory birds. Bird surveys are required to estimate the temporal and spatial use of the CD-C project area and vicinity by birds (see **Section 2.2.2.2**). Marine surveillance radar surveys and ground surveys such as point counts, line transect surveys, and spot mapping could be used to determine presence of these species.

Point count surveys can be used as a tool to determine songbird and other groups of birds. Radar surveys using marine radar surveillance can also be used to determine avian species flight patterns in the project area (i.e. foraging movements and migration). Multiple sampling locations should be identified within the selected study areas and surveyed in consultation with the BLM and WGFD (**Table I-2a**).

### **2.2.6 Amphibians, Reptiles, and Fish and Associated Habitats**

Amphibian surveys would be required since there are riparian habitats or playas within the CD-C project area. In addition, surveys for site-specific species or associated habitats will be implemented at the APD and/or right-of-way application processes to determine the potential to affect amphibians, reptile and fish species.

**Amphibian Species and Associated Habitats.** Habitat mapping, Acoustic Breeding Surveys, and Visual Encounter Surveys (**Table I-2a**) can be used to determine amphibian species presence within the CD-C project area and at the APD and/or right-of-way application process.

**Reptile Species and Associated Habitats.** Presence/absence surveys and hibernacula/maternity den site searches will be required in potential reptile habitat (BLM 2011) at the CD-C project area and site-specific APD and/or right-of-way level.

**Fish Species and Associated Habitats.** The use of hydroacoustics, gill netting, seining, and electrofishing by boat, canoe, or backpack can be used to measure fish abundance and distribution (AZGFD 2009, Taylor and Maxwell 2007).

### 2.2.7 General Wildlife Species

BLM staff will be responsible for maintaining records of selected wildlife species observed during the course of their activities on the project area. Operator personnel may also provide data on wildlife observations. The information provided will include observations of wildlife species, their numbers, location, activity, and other pertinent data as applicable and identified on the General Wildlife Observation Data Sheet (**Table I-2a**). Where Operators are uncertain of the United States Geological Survey (USGS) coordinates for an observation, a general description of the location may be provided and in instances where species or sex information is questionable, Operators will identify the observation as such.

Additional inventory and monitoring measures may be applied for other species as specified in annual reports (**Table I-1**). Surveys will be conducted in adherence with protocol to be established by the BLM, other agencies and Operators, and Operators may provide financial assistance for these inventory and monitoring investigations (**Table I-2a**).

## 2.3 DETERMINE AND IMPLEMENT PROTECTION MEASURES, EFFECTS ANALYSIS, AND APPLY ADAPTIVE MANAGEMENT

Long-term studies and monitoring programs identified above, along with implementing protection measures, should be established to evaluate and compare the effectiveness of various mitigation techniques. Efforts should be made to continually integrate monitoring data into adaptive management strategies, including making individual and compiled results available to industry and agencies to improve energy-development and mitigation techniques. Opportunities to enable agencies, conservation organizations, and energy companies to collaboratively interact and contribute data should be identified (WGFD 2010). Evaluations of the biological response of focal species are integral to assessing success in delivering conservation programs (Naugle 2011).

During project development, the BLM is responsible to manage or restore habitat to conserve, recover, and maintain species populations consistent with the CD-C EIS and Rawlins RMP (BLM 2008a) plans. The Rawlins RMP states that a full range of mitigation options will be considered when developing mitigation for project-level activities, including those located within the CD-C project area. The wildlife protection measures proposed herein have been developed from past measures identified for oil and gas developments in Wyoming and are basically tools to implement while exercising adaptive management. Additional measures may be included and/or existing measures may be modified in any given year as allowable and as deemed appropriate by BLM in consultation with other agencies, Operators, and interested parties. These measures will be specified in annual reports (**Table I-1**). Protection measures will be implemented by Operators with assistance from and/or in consultation with the BLM. In addition, these measures may be modified on a site-specific basis as deemed appropriate by the BLM after completion of the APD and right-of-way application field reviews.

The principal protection measure for most wildlife will be species- and project-specific measures as well as general wildlife and associated habitat protection measures. The implementation of these measures may also benefit other wildlife species found on and adjacent to the project area. Sensitive and crucial habitats should be avoided where possible. Protection measures (e.g., BMPs identified in the Rawlins RMP and CD-C EIS, **Appendix C**) will be applied based on the analysis of information gathered through inventory and monitoring. These BMPs are included in the Rawlins RMP and CD-C EIS and include, but are not limited to, measures such as timing restrictions to protect species and habitat from disruptive activities during critical periods, modifications of BLM fences to allow big game species greater freedom of movement to avoid disruptive activities, and vegetation treatments, such as herbicide treatments, seeding, prescribed burning, cutting/chopping for regeneration, planting shrubs or trees, or fertilization. The process of adaptive management will be used to determine the effectiveness of BMPs and necessary changes in conservation management will be made if identified. This process allows ineffective



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management actions to be modified, or new actions implemented, to reduce impacts to wildlife from development.

The Nature Conservancy's (TNC) *Energy by Design – Cooperative Mitigation Planning for the CD-C Gas Field* (**Appendix G**) is a science-based approach designed to reduce conflicts and steer development away from conservation priorities, increase the cost-effectiveness of mitigation, and direct funding to higher-value conservation. The project blends landscape-level conservation with the mitigation hierarchy including: (1) avoid; (2) minimize/restore; and (3) offset to improve mitigation efforts. This is accomplished in a four step process which includes the following;

- a. Develop a landscape conservation plan (or use an existing landscape plan);
- b. Blend landscape conservation planning with mitigation hierarchy to evaluate conservation and development conflicts;
- c. Determine the residual impacts associated with development and select an optimal offset portfolio; and then
- d. Estimate the offset contribution to conservation goals.

TNC's final report for the CD-C project area was completed on August 1, 2009. Protection measures and adaptive management for the CD-C project area could be identified from this plan.

The *Wyoming Landscape Conservation Initiative* (WLCI) was created in 2007 as a multi-agency and stakeholders' initiative designed to maintain and enhance wildlife habitat and other resource values within energy development and other changes. Partners are conducting science-based research and monitoring, completing habitat enhancements and restoration, encouraging effective reclamation and mitigation practices, identifying and prioritizing landscape-scale conservation work, and promoting grazing practices which benefit wildlife, ranchers, and open-space conservation. Initial funding for this program has come through federal appropriations and projects to date have included fence modifications and enclosure fencing, prescribed burns, riparian enhancements, invasive species treatments, river restoration, and conservation easements (WGFD 2010). Protection measures and adaptive management for the CD-C project area could be identified from this plan.

### 2.3.1 Special Status Species and Associated Habitats: Protection Measures (Adaptive Management)

The level of protection required for Special Status Species is obligatory under the ESA. If crucial features for any Special Status Species are found during on-site surveys of the proposed project, avoidance of these features will be required first. In the event this is not feasible, the BLM will conference and/or consult and coordinate with the USFWS to determine and implement the most effective protection measures required to protect Special Status Species and their habitats. Habitat and species conservation measures for Special Status Species are identified in the Rawlins RMP (BLM 2008a) biological assessment and the biological opinion. Both documents will be adhered to for compliance with the ESA and conservation measures will be applied to all surface-disturbing and disruptive activities, as appropriate. In the event that a Special Status Species is observed, especially during construction activities, work at the project site will be curtailed until there is concurrence between BLM and the USFWS on what activities can be authorized. Activities will, in most cases, be delayed until such time that no adverse effects will occur.

The Rawlins RMP requires the BLM maintain, restore, or enhance Special Status Species, as well as Sensitive Species habitat to prevent listing under the ESA, in coordination with other local, state and federal agencies. It is assumed that the protocol specified for general wildlife will likely benefit Special Status Species as well. If any management agency identifies a potential for impacts to any Special Status Species, additional measures may be implemented as specified in annual reports.

**Black-footed Ferret.** Habitat and species conservation measures for the black-footed ferret are identified in the Rawlins RMP (BLM 2008a) biological assessment and the biological opinion. Both documents will be adhered to for compliance with the ESA and conservation measures will be applied to all surface-disturbing and disruptive activities, as appropriate. These protection measures are identified to reduce impacts to the black-footed ferret within the CD-C project area (Rawlins RMP, page 2-54). If black-footed ferrets are found on the project area, the USFWS will be notified immediately and formal consultations will be initiated to develop strategies that ensure no adverse effects to the species. Before ground-disturbing activities are initiated in black-footed ferret habitat, authorizations to proceed must be received from the BLM, in consultation with the USFWS.

**Greater Sage-Grouse.** Habitat and species protection management actions for greater sage-grouse are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to the greater sage-grouse within the CD-C project area (Rawlins RMP, pages 2-54 to 2-55). Projects located within the Wyoming Governor's Core Greater Sage-Grouse habitat (Executive Order 2011-5) will have additional protection measures attached to reduce and/or remove potential impacts to greater sage-grouse (IM WY-2012-019). To control the population of mosquitoes that might spread West Nile virus, larvicidal briquettes will be placed in standing water pools as appropriate. Adult mosquitoes could also be treated with insecticides if necessary (BLM 2008c).

**Ute Ladies'-Tresses Plant.** Habitat and species conservation measures for the Ute ladies'-tresses plant are identified in the Rawlins RMP (BLM 2008a) biological assessment and the biological opinion. Both documents will be adhered to for compliance with the ESA and conservation measures will be applied to all surface-disturbing and disruptive activities, as appropriate. These protection measures are identified to reduce impacts to the Ute ladies'-tresses plant within the CD-C project area (Rawlins RMP, page 2-54).

**Colorado River Fish Species.** Habitat and species conservation measures for Colorado River fish species are identified in the Rawlins RMP (BLM 2008a) biological assessment and the biological opinion. Both documents will be adhered to for compliance with the ESA and conservation measures will be applied to all surface-disturbing and disruptive activities, as appropriate. These protection measures are identified in the Rawlins RMP, page 2-54.

### 2.3.2 BLM Wyoming State Sensitive Species (Plants/Animals) and Associated Habitats: Protection Measures (Adaptive Management)

Surface-disturbing and disruptive activities that would potentially affect the habitat of Special Status Species will be intensively managed on a case-by-case basis. In addition, surface-disturbing and disruptive activities will be intensively managed to minimize impacts on identified crucial habitat for sensitive species for the purpose of protecting these species and their associated habitats. Coordination with the WGFD will allow the *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats* management actions to be implemented to reduce impacts to BLM sensitive species (Table I-2b).

#### 2.3.2.1 BLM Sensitive Small Mammals and Associated Habitats

**Bat Species (long-eared myotis, fringed myotis, spotted bat, Townsend's big-eared bat).** Habitat and species protection measures for BLM sensitive bat species are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to bat species within the CD-C project area (Rawlins RMP, page 2-54). In addition, all open vent stack equipment shall be designed and constructed to prevent bat use and potential mortalities.

**Pygmy Rabbit.** Habitat and species protection measures for the pygmy rabbit are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to the pygmy rabbits within the CD-C project area (Rawlins RMP, page 2-54). The BLM has identified additional protection measures to reduce impacts to this species.

**Wyoming Pocket Gopher.** Habitat and species protection measures for the Wyoming pocket gopher are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to the Wyoming pocket gopher within the CD-C project area (Rawlins RMP, page 2-54). To protect the identified Wyoming pocket gopher and associated habitat, the BLM has identified additional protection measures to reduce impacts to this species. The survey protocol is available from the BLM Rawlins Field Office upon request.

**White-tailed Prairie Dog.** Habitat and species protection measures for the white-tailed prairie dog are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to the white-tailed prairie dog within the CD-C project area (Rawlins RMP, page 2-54 to 2-55).

### **2.3.2.2 BLM Sensitive Upland Game Birds, Migratory Raptors, Songbirds, Shorebirds, Waterfowl and Habitats**

Habitat and species protection measures for the BLM Sensitive raptors, songbirds, shorebirds and waterfowl are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to upland game birds, migratory raptors, songbirds, shorebirds, and waterfowl within the CD-C project area (Rawlins RMP, page 2-52 to 2-55). These are required to comply with both the Rawlins RMP and the MBTA.

**Songbirds (loggerhead shrike, sage thrasher, Brewer's sparrow, sage sparrow).** All open vent stack equipment shall be designed and constructed to prevent avian mortalities due to bird use and perching. In addition, nesting habitats could be treated with nitrogen fertilizers (BLM 2008c).

**Shorebirds (white-faced ibis, long-billed curlew).** Protection measures that could reduce impacts to nesting shorebirds would be implemented on surface-disturbing and disruptive activities located near water habitats such as mudflats, salt ponds, marshes, rocky shores and agricultural fields (USFWS 2011).

**Waterfowl (trumpeter swan).** Protection measures that could reduce impacts to waterfowl would be implemented on surface-disturbing and disruptive activities located near water habitats such as wetland, and marshes (Wetlands Regional Monitoring Program Plan 2002). In addition, not permitting the use of open pits (Naugle 2011) in the natural gas field would reduce impacts to waterfowl species.

**Bald Eagle and Ferruginous Hawk.** Habitat and species protection measures for the bald eagle and ferruginous hawk are identified in the Rawlins RMP (BLM 2008a), pages 2-53 to 2-55. These protection measures are identified to reduce impacts to the bald eagle and ferruginous hawk within the CD-C project area. Protection protocol will be as described for raptors (See **Section 2.3.1**). Additional measures will be applied on a species- or site-specific basis, as deemed appropriate by the BLM and/or USFWS, and specified in annual reports.

**Mountain Plover.** Habitat and species protection measures for the mountain plover are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to the mountain plover within the CD-C project area (Rawlins RMP, page 2-52 to 2-55). Mountain plover habitat will be avoided where practical due to the presence of alternative well and road development sites. Where these habitats will be disturbed, reclamation will utilize procedures designed to reestablish suitable plover habitat. The primary protection measure for mountain plover on the project area will be avoidance plover habitat during the breeding season.

**Burrowing Owl.** Habitat and species protection measures for the burrowing owl are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to the burrowing owl within the CD-C project area (Rawlins RMP, page 2-53 to 2-55).

### **2.3.2.3 BLM Sensitive Amphibians, Reptiles, and Fish Species and Associated Habitats**

Habitat and species protection measures for the BLM sensitive amphibian, reptile and fish species are identified in the Rawlins RMP (BLM 2008a), page 2-54. In addition, a portion of the Upper Muddy

Creek/Grizzly Wildlife Habitat Management Area occurs within the CD-C project area (Rawlins RMP, page 2-41) which affords additional protection measures for Colorado River fish species unique to the Muddy Creek watershed.

#### 2.3.2.4 BLM Sensitive Plant Species and Associated Habitats

Habitat and species protection measures for the BLM sensitive plant species are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to sensitive plant species within the CD-C project area (Rawlins RMP, page 2-54 to 2-55).

Operators will finance site-specific surveys for BLM Sensitive Plant Species prior to any surface disturbance in areas determined by the BLM to contain potential habitat for such species (BLM 2008b). These surveys will be completed by a qualified botanist as authorized by the BLM and this botanist will be subject to the BLM's 6840 policy requirements. Data from these surveys will be provided to the BLM, and if any sensitive plants or habitats are found, BLM recommendations for avoidance of the proposed project location will be implemented (BLM 2008c).

**Meadow Milkvetch, Cedar Rim Thistle, Gibbens' Beardtongue and Persistent Sepal Yellowcress Plants.** In extreme cases when the proposed project cannot be relocated, then seed-banking of these plants from the disturbance location would be recommended to attempt off-site propagation, since most of the common techniques such as off-site compensation or habitat restoration have proven largely unsuccessful (BLM 1997).

#### 2.3.3 Big Game Species and Associated Habitats: Protection Measures (Adaptive Management)

**Big Game Crucial Winter Range.** The Rawlins RMP (BLM 2008a) requires the BLM to maintain, restore, or enhance habitat function in crucial winter range, including those areas located within the CD-C project area. Habitat and species protection measures for the big game species and their habitats are identified in the Rawlins RMP. These protection measures are identified to reduce impacts to big game species within the CD-C project area (Rawlins RMP, page 2-53 to 2-54). In addition, a portion of the Upper Muddy Creek/Grizzly Wildlife Habitat Management Area occurs within the CD-C project area (Rawlins RMP, page 2-41) which affords additional protection measures for elk and mule deer crucial winter range. Coordination with the WGFD will allow the *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats* management actions to be implemented to reduce impacts to big game species (**Table I-2b**).

Snow fences, if used, will be limited to segments of ¼ mile or less. Project personnel will also be advised to minimize stopping and exiting their vehicles in big game winter habitat during crucial winter periods. In addition, escape openings will be provided along roads in big game crucial winter ranges, as designated by the BLM, to facilitate exit of big game animals from snowplowed roads. The use of gates on roads within development areas would also preclude or limit motorized public access in sensitive wildlife areas. Additional habitat protection and/or improvement measures may also be applied in any given year as directed by the BLM, in consultation with Operators and other agencies, and specified in annual reports.

There are several projects that can be implemented to improve habitat and use for big game species which include, but are not limited to: (1) fertilization projects which help offset direct and indirect habitat losses by increasing sagebrush production, enhancing available winter forage and potentially increasing palatability and nutrient quality for wintering big game (specifically mule deer) (BLM 2012, BLM 2008c); (2) closing roads from January 1-April 30 each year to protect big game from disruptive human activity which, during difficult winter months, can increase the mortality rate for these animals and patrolling the areas is required to allow the BLM to educate the public, distribute maps, answer questions, deter violators, encourage the public to report violations, and issue citations when needed; (3) implement chemical thinning treatments (tebuthion, or Spike™) to increase forage variety, quantity and quality

and improve the big sagebrush and mountain shrub age-class structure; (4) establish conservation easements; (5) implement fence modification projects; (6) implement prescribed fire treatments for big game species (e.g., spring and fall ranges should focus on herbaceous component to help does with fawning and winter ranges should focus more on shrubs and shrub productivity); (7) seeding after fires; (8) mechanical treatments such as crushing with an aerator and including seeding in the treatment; (9) chaining, disking and imprinting pipe harrowing and aerating; (10) mowing; (11) other vegetation treatments such as planting of shrubs and aspen; and (12) control of invasive weeds (BLM 2012).

**Big Game Migration Corridors.** Big game migration corridor habitat protection measures are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to big game species within the CD-C project area (Rawlins RMP, page 2-54). Surface-disturbing and disruptive activities will be managed, on a case-by-case basis, in identified big game migration and transitional ranges to maintain their integrity and function for big game species in these areas. Although fences are not a direct result of natural gas development, fences that are identified to be a problem to big game migration, as a result of development, will be modified to meet BLM fence standards. New fences are allowed in big game migration corridors, provided they meet BLM fence standards.

### 2.3.4 Raptors and Associated Habitats Protection Measures (Adaptive Management)

The primary protection measure for raptor species on the project area will be avoidance of nest locations during the breeding season. Habitat and species protection measures for raptor species are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to raptor species within the CD-C project area (Rawlins RMP, page 2-53). Coordination with the WGFD will allow the *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats* management actions to be implemented to reduce impacts to raptor species (**Table I-2b**)

The goshawk, osprey, and screech owl raptor species are located within the RFO area; however, they require different habitat types than those located within the CD-C project area and are highly unlikely to nest within the project area. In the rare event that one of these species is found, their breeding and nesting habitat will be protected by the protection measures found in the Rawlins RMP.

### 2.3.5 Songbirds, Waterfowl, and Shorebirds and Associated Habitats Protection Measures (Adaptive Management)

Habitat and species protection measures for songbirds, waterfowl, and shorebirds species are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to songbirds, waterfowl, and shorebirds within the CD-C project area (Rawlins RMP, page 2-52 to 2-54). All open vent stack equipment shall be designed and constructed to prevent use birds and to discourage perching. Surface-disturbing and disruptive activities will be intensively managed. BMPs will be applied to surface-disturbing and disruptive activities to maintain or enhance habitat for these species ((BLM 2008a). Coordination with the WGFD will allow the *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats* management actions to be implemented to reduce impacts to songbirds, waterfowl, and shorebird species (**Table I-2b**)

### 2.3.6 Amphibians, Reptiles, and Fish and Associated Habitats Protection Measures (Adaptive Management)

Habitat and species protection measures for amphibian, reptile and fish species are identified in the Rawlins RMP (BLM 2008a). These protection measures are identified to reduce impacts to the amphibians, reptiles, and fish within the CD-C project area (Rawlins RMP, page 2-54). Coordination with the WGFD will allow the *Recommendations for Development of Oil and Gas Resources Within Important Wildlife Habitats* management actions to be implemented to reduce impacts to amphibian, reptile, and fish species (**Table I-2b**)

### 2.3.7 General Wildlife Species Protection Measures (Adaptive Management)

The Rawlins RMP (BLM 2008a) requires the BLM manage projects through facility placement and minimization of construction disturbance to maintain connectivity between large contiguous blocks of undisturbed habitat. Reclamation activities associated with proposed projects within the CD-C project area must include wildlife habitat objectives in the plans.

Unless otherwise indicated, the following protection measures will be applied for all wildlife species. Additional measures primarily designed to minimize impacts to other resources (e.g., vegetation and surface water resources, including wetlands, steep slopes, etc.) are identified in the EIS in **Chapter 4**, and these measures may provide additional protection for wildlife. Additional actions may be applied in any given year to further minimize potential impacts to wildlife. These actions will be specified in annual reports.

All roads on and adjacent to the project area that are required for the proposed project will be appropriately constructed, improved, maintained, and signed to minimize potential wildlife and vehicle collisions and facilitate wildlife (most notably big game) movement through the project area. Appropriate speed limits will be adhered to on all project roads, and Operators will advise employees and contractors regarding these speed limits. Some existing roads on the project area and surrounding transportation planning area may be reclaimed if they become redundant, and/or closed (gated and locked, year-round or seasonally) to deny unnecessary access.

To protect important habitat in portions of the project area (i.e., ephemeral draws dominated by basin big sagebrush), areas with sagebrush greater than three feet tall will be avoided where possible.

Additional non-species-specific wildlife mitigations that may reduce and/or eliminate potential impacts to species and associated habitats include the following:

- a. Reserve, work-over, and flare pits and other locations potentially hazardous to wildlife will be adequately protected by netting and/or fencing as directed by the BLM to prohibit wildlife access.
- b. If dead or injured raptors, big game, migratory birds, or unusual wildlife are observed on the project area, Operator personnel will contact the appropriate BLM and WGFD offices. Under no circumstances will dead or injured wildlife be approached or handled by Operator personnel.
- c. Employee and contractor education will be conducted regarding wildlife laws. If violations are discovered on the project area, Operators will immediately notify the appropriate agency. If the violation is committed by an employee or contractor, said employee or contractor will be disciplined and may be dismissed by the Operator and/or prosecuted by the WGFD and/or USFWS.
- d. Operators will implement policies designed to control off-site activities of operation personnel and littering, and will notify all employees (contract and company) that conviction of a violation can result in disciplinary action, including dismissal.
- e. Use of smaller rigs, directional drilling, oak mats, and purpose-built rigs.
- f. When studies become available that indicate the need for changes, modifications of timing or other stipulations would be implemented or deleted based on the findings.

Additional project- and site-specific mitigation measures may be added in future years, as specified in annual reports.

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**Table I-1: Summary of general wildlife meeting and reporting requirements**

Action	Dates	Responsible Entity
Annual tentative plan of development	By November 15, annually	Operator using format identified in Table I-2a
Annual inventory, monitoring, protection measures, and effects analysis data will be completed	By November 15, annually	Operator using format identified by the BLM for the annual report
Annual reports	Annually: Final—early February	BLM will review and determine if requirements are being met
Annual meeting	December and as necessary	BLM with participation by other agencies and Operators

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2a: Summary of references for wildlife inventory and monitoring requirements**

<b>Special Status Species; BLM Sensitive Species; Big Game Crucial Winter Range and Migration Corridors; Raptors; Songbirds, Waterfowl, and Shorebirds; Amphibians, Reptiles, and Fish; and General Wildlife Species and Associated Habitats located within and adjacent to the CD-C project area</b> (Operators will be required to use the inventory and monitoring protocols identified below for each species in this table. Changes to the protocols will be based on decisions made by the BLM and will be discussed at the Monitoring without Borders Meetings held each year and at other meetings as deemed appropriate)	
<b>Species / Associated Habitat</b>	<b>Inventory and Monitoring Requirements</b>
<b>Threatened, Endangered, Candidate, and Proposed Species (Special Status Species)</b>	
Black-footed Ferret (E) ( <i>Mustela nigripes</i> )	(CD/WII EIS [BLM 2000] and BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,10,14,17, 26 and 36)
	<b>Habitat, Species:</b> WGFD: WY Wyoming State Wildlife Action Plan- 2010 (WY SWAP 2010) Species Accounts p. IV-2-20 to 2-11; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Desert Shrublands p. III-3-8 to 3-10
	<i>USFWS 1989. Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, Colorado, and Albuquerque, New Mexico: U.S. Fish and Wildlife Service. April 1989. 10 pp. + appendices.</i>
Greater Sage-Grouse (C) ( <i>Centrocercus urophasianus</i> )	Annually from March to mid-May to determine lek activity. BLM or BLM-approved Operator-financed biologist. WGFD standard protocols/form required for grouse lek monitoring (CD/WII EIS [BLM 2000] and BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36)
	At least every five years. BLM or BLM-approved Operator-financed biologist with Operator-provided financial assistance for aircraft rental will inventory for new leks. RFO (CD/WII EIS [BLM 2000] and BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36)
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-69 to 1-70; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Desert Shrublands p. III-3-8 to 3-10
	<i>Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate. Instruction Memorandum No. WY-2010-012. December 29, 2009. EMS Transmission: January 4, 2010.</i>
	<i>Wyoming Game and Fish Department Greater Sage-Grouse Lek Monitoring Techniques.</i>
	<b>Monitoring Techniques, Survey Types:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development. Pages 11-12 and Appendix C.</i>
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >
	In order to resolve conflicts with vegetation treatments adjacent to and within the CD-C project area, refer to the nine (9) steps in the <i>Wyoming Guidelines for Managing Sagebrush Communities with an Emphasis on Fire Management</i> (Wyoming Interagency Vegetation Committee 2002:12)
Ute Ladies'-Tresses Plant (T) ( <i>Spiranthes diluvialis</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,14,15,17,26 and 36; Vegetation p. 2-46 to 2-48.
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	<b>Rare Plant Mapping:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development. Page13.</i>
	<i>BLM Buffalo Field Office Wildlife Surveys;</i> < <a href="http://www.blm.gov/wy/st/en/field_offices/Buffero/wildlife.html">http://www.blm.gov/wy/st/en/field_offices/Buffero/wildlife.html</a> >



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**Table I-2a: Summary of references for wildlife inventory and monitoring requirements, *continued***

Species / Associated Habitat	Inventory and Monitoring Requirements
Colorado River Fish Species: bonytail ( <i>Gila elegans</i> ), Colorado pikeminnow ( <i>Ptychocheilus lucius</i> ), humpback chub ( <i>Gila cypha</i> ), razorback sucker ( <i>Xyrauchen texanus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	<b>Protection Measures:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development.</i> Appendix H.
<b>BLM Sensitive Species</b>	
Bat species: long-eared myotis ( <i>Myotis evotis</i> ), fringed myotis ( <i>Myotis thysanodes</i> ), spotted bat ( <i>Euderma maculatum</i> ), Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP Species Accounts p. IV-2-41, p. IV-2-27, p. IV-2-77 and p. IV-2-84; spotted bat- Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Aspen/Deciduous Forest p. III-1-11 to 1-13, Cliffs-Canyons-Caves and Rock Outcrops p. III-2-8 to 2-10, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	<b>Bat Carcass Survey, Bat Protection Plan:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development.</i> Page 3 and Appendix A.
	Goodbar, J. R. 1999. Oil and Gas Drilling in Cave and Karst Areas: A Process of Mitigating Impacts. Proceedings of the 1997 Karst and Cave Management Symposium, 13 <sup>th</sup> National Cave Management Symposium, Bellingham, Washington and Chilliwack and Vancouver Island, BC, Canada, October 7-10, 1997. pp. 195-197.
	Bat Conservation International. Media and Information Literature Database. Literature Library. <a href="http://www.batcon.org">www.batcon.org</a>
Pygmy rabbit ( <i>Sylvilagus idahoensis</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-2-70; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Aspen/Deciduous Forest p. III-1-11 to 1-13
	<b>Survey Protocol:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development.</i> Appendix F.
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >
Wyoming pocket gopher ( <i>Thomomys clusius</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-2-97, Desert Shrublands p. III-3-8 to 3-10
	<b>Survey Protocol, Sampling Techniques:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development.</i> Appendix I.
White-tailed prairie dog ( <i>Cynomys gunnisoni</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2a: Summary of references for wildlife inventory and monitoring requirements, *continued***

Species / Associated Habitat	Inventory and Monitoring Requirements
Swift Fox ( <i>Vulpes velox</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, p. IV-2-81; Habitat Section- Sagebrush Shrublands p. III-9-12 to 9-15
Songbirds: loggerhead shrike ( <i>Lanius ludovicianus</i> ), sage thrasher ( <i>Oreoscoptes montanus</i> ), Brewer's sparrow ( <i>Spizella breweri</i> ), sage sparrow ( <i>Amphispiza belli</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-29, p. IV-1-112 and p. IV-1-114; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Foothill Shrublands p. III-4-10 to 4-12 <b>Fixed Point Count Surveys and Marine Surveillance Radar Surveys:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . pp 3 – 11.
Shorebirds: white-faced ibis ( <i>Plegadis chihi</i> ), long-billed curlew ( <i>Numenius americanus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-85 and p. IV-1-136, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13 Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP) <b>Species Survey, Monitoring:</b> U. S. Shorebird Conservation Plan: A Comprehensive Monitoring Program for North American Shorebirds. 2000. Pages 80-81 Wetlands Regional Monitoring Program Plan 2002, Part 2: Data Collection Protocols Shorebirds, Gary W. Page, Point Reyes Bird Observatory, Stinson Beach CA and Nils Warnock, Point Reyes Bird Observatory, Stinson Beach CA
Waterfowl: trumpeter swan ( <i>Cygnus buccinator</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-125, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13 Trumpeter Swan Survey of the Rocky Mountain Population Winter 2011, U.S. Fish and Wildlife Service Migratory Birds and State Programs Mountain-Prairie Region Lakewood, Colorado, April 12, 2011 < <a href="http://www.fws.gov/mountain-prairie/species/birds/trumpeterswan/trumpeter_swan_survey_winter_2011.pdf">http://www.fws.gov/mountain-prairie/species/birds/trumpeterswan/trumpeter_swan_survey_winter_2011.pdf</a> > USFWS Red Rock Lakes National Wildlife Refuge. Mountain-Prairie Region. March 1, 2011 < <a href="http://www.fws.gov/redrocks/Refuge-Management-Trumpeter-Swan.htm">http://www.fws.gov/redrocks/Refuge-Management-Trumpeter-Swan.htm</a> >
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,14,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-8, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13 <i>Field Protocol for Spatially-Balanced Sampling of Landbird Populations</i> . Hanni, D.J., C.M. White, R.A. Sparks, J.A. Blakesley, G.J. Levandoski, and J.J. Birek. 2010. Unpublished report. Rocky Mountain Bird Observatory, Brighton, CO. 34pp. <b>Survey Protocol, Raptor Nesting/Habitat Surveys:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . pp3 – 11 and Appendix G
Ferruginous hawk ( <i>Buteo regalis</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-55; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15 <i>Field Protocol for Spatially-Balanced Sampling of Landbird Populations</i> . Hanni, D.J., C.M. White, R.A. Sparks, J.A. Blakesley, G.J. Levandoski, and J.J. Birek. 2010. Unpublished report. Rocky Mountain Bird Observatory, Brighton, CO. 34pp.

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2a: Summary of references for wildlife inventory and monitoring requirements, *continued***

Species / Associated Habitat	Inventory and Monitoring Requirements
	<b>Fixed Point Count Surveys and Marine Surveillance Radar Surveys:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . pp3 – 11
	<b>Raptor Nesting/Habitat Surveys:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . Appendix G.
Mountain plover ( <i>Charadrius montanus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-92, Habitat Section-Desert Shrublands p. III-3-8 to 3-10
	<i>Mountain Plover Survey Guidelines</i> . U.S. Fish and Wildlife Service. March 2002.
	Annually from May to July. BLM or BLM-approved Operator-financed biologist. Standard form required for mountain plover monitoring.
	<b>Survey Protocol, Survey Guidelines:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . Page 12 and Appendix D.
	<b>Species Survey, Monitoring:</b> <i>U. S. Shorebird Conservation Plan: A Comprehensive Monitoring Program for North American Shorebirds</i> . 2000. Pages 60-61
Burrowing owl ( <i>Athene cunicularia</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-33; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Desert Shrublands p. III-3-8 to 3-10
	<b>Survey Protocol:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . Page 8 and Appendix B.
Amphibians: northern leopard frog ( <i>Rana pipiens</i> ), Great Basin spadefoot toad ( <i>Spea intermontana</i> )	BLM 2008 Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-4-9, Habitat Section-Riparian p. III-8-14 to 8-18, Foothill Shrublands p. III-4-10 to 4-12, Wetlands p. III-10-11 to 10-13
	<b>Habitat, Acoustic and Visual Survey Protocol:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . Page 7.
Fish: Colorado River cutthroat trout ( <i>Oncorhynchus clarkii pleuriticus</i> ), roundtail chub ( <i>Gila robusta</i> ), flannelmouth sucker ( <i>Catostomus latipinnis</i> ), and bluehead sucker ( <i>Catostomus discobolus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-3-19, p. IV-3-68, p. IV-3-28 and p. IV-3-3; III-13-17 thru 13-19; Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	AZ Game and Fish Department Fish Survey Techniques 2009. < <a href="http://www.azgfd.gov/w_c/Fish_Survey_Techniques.shtml">http://www.azgfd.gov/w_c/Fish_Survey_Techniques.shtml</a> >
	Hydroacoustics: Lakes and Reservoirs. J. Christopher Taylor and Suzanne L. Maxwell. < <a href="http://www.stateofthesalmon.org/fieldprotocols/downloads/SFPH_p5-.pdf">http://www.stateofthesalmon.org/fieldprotocols/downloads/SFPH_p5-.pdf</a> >
Meadow milkvetch plant ( <i>Astragalus diversifolius</i> var. <i>diversifolius</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
Cedar Rim thistle plant ( <i>Cirsium aridum</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Habitat Section-Desert Shrublands p. III-3-8 to 3-10, Cliffs-Canyons-Caves and Rock Outcrops p. III-2-8 to 2-10

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2a: Summary of references for wildlife inventory and monitoring requirements, *continued***

Species / Associated Habitat	Inventory and Monitoring Requirements
Gibbens' beardtongue plant ( <i>Penstemon gibbensii</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Habitat Section-Desert Shrublands p. III-3-8 to 3-10, Cliffs-Canyons-Caves and Rock Outcrops p. III-2-8 to 2-10
Persistent sepal yellowcress plant ( <i>Rorippa calycina</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
<b>Big Game Crucial Winter Range, Migration Corridors, and Associated Habitats</b>	
Big Game Crucial Winter Range	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8, 9,15,17,26 and 36
	WGFD: BLM will request data from WGFD
	<b>Habitat, Species:</b> WGFD: Habitat Section Sagebrush Shrublands p. III-9-12 to 9-15, Foothill Shrublands p. III-4-10 to 4-12, Desert Shrublands p. III-3-8 to 3-10
	Radio or satellite telemetry to determine big game movement
	Pellet Count Surveys
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >
Big Game Migration Corridors	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,9,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: Habitat Section Sagebrush Shrublands p. III-9-12 to 9-15, Foothill Shrublands p. III-4-10 to 4-12, Desert Shrublands p. III-3-8 to 3-10
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >
<b>Raptors and Associated Habitats</b>	
Raptors (Non-Special Status Species and BLM Sensitive Species)	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-other bird species
	Annually from April to July to determine nest activity. BLM or BLM-approved Operator-financed biologist. Standard form required for raptor nest monitoring
	At least every five years. BLM or BLM-approved Operator-financed biologist with Operator-provided financial assistance for aircraft rental.
	<i>Field Protocol for Spatially-Balanced Sampling of Landbird Populations.</i> Hanni, D.J., C.M. White, R.A. Sparks, J.A. Blakesley, G.J. Levandoski, and J.J. Birek. 2010. Unpublished report. Rocky Mountain Bird Observatory, Brighton, CO. 34pp.
	<b>Survey Protocol, Avian Protection Plan:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development.</i> p. 3 – 11 for Fixed Point Count Surveys and Marine Surveillance Radar Surveys.
	<i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development.</i> Appendix G.

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2a: Summary of references for wildlife inventory and monitoring requirements, *continued***

Species / Associated Habitat	Inventory and Monitoring Requirements
<b>Songbirds, Waterfowl, and Shorebirds and Associated Habitats</b>	
Songbirds, waterfowl, and shorebirds and associated habitats (Non-Special Status Species and BLM Sensitive Species)	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-other bird species, Habitat Section-Riparian p. III-8-14 to 8-18 – other species
	<i>Field Protocol for Spatially-Balanced Sampling of Landbird Populations.</i> Hanni, D.J., C.M. White, R.A. Sparks, J.A. Blakesley, G.J. Levandoski, and J.J. Birek. 2010. Unpublished report. Rocky Mountain Bird Observatory, Brighton, CO. 34pp.
	<b>Survey Protocol:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development.</i> pp3 – 11 for Fixed Point Count Surveys and Marine Surveillance Radar Surveys.
	<b>Species Survey, Monitoring:</b> <i>U. S. Shorebird Conservation Plan: A Comprehensive Monitoring Program for North American Shorebirds.</i> 2000. Pages 60-61, 80-81
<b>Amphibians, Reptiles, and Fish and Associated Habitats</b>	
Amphibians, reptiles, and fish and associated habitats (Non-Special Status Species and BLM Sensitive Species)	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,10,14,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-other amphibian, reptile and fish species; WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19 – other fish species, Habitat Section-Riparian p. III-8-14 to 8-18 – other species
	<b>Habitat Mapping, Acoustic Breeding Surveys, Visual Surveys</b> <b>Amphibians/Reptiles:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development,</i> p 7.
	AZ Game and Fish Department Fish Survey Techniques. 2009. < <a href="http://www.azgfd.gov/w_c/Fish_Survey_Techniques.shtml">http://www.azgfd.gov/w_c/Fish_Survey_Techniques.shtml</a> >
	Hydroacoustics: Lakes and Reservoirs (Taylor and Maxwell 2007) < <a href="http://www.stateofthesalmon.org/fieldprotocols/downloads/SFPH_p5.pdf">http://www.stateofthesalmon.org/fieldprotocols/downloads/SFPH_p5.pdf</a> >
<b>General Wildlife Species and Associated Habitats</b>	
General Wildlife Species	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 8,14,15,17,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-crustacean and mollusk species
	General Wildlife Observation Data Sheet. Surveys will be conducted in adherence with protocol to be established by the BLM, other agencies and Operators and Operators may provide financial assistance for these investigations
	Additional inventory and monitoring measures may be applied for other species as specified in annual reports. BLM with participation by other agencies and Operators.

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2b. Summary of references for wildlife protection measures, cause and effect studies, and adaptive management requirements: wildlife and associated habitats**

<b>Special Status Species; BLM Sensitive Species; Big Game Crucial Winter Range and Migration Corridors; Raptors; Songbirds, Waterfowl, and Shorebirds; Amphibians, Reptiles, and Fish; and General Wildlife Species and associated habitats located within and adjacent to the CD-C project area</b> (Operators will be required to use the inventory and monitoring protocols identified below for each species in this table. Changes to the protocols will be based on decisions made by the BLM and will be discussed at the Monitoring without Borders Meetings held each year and other meetings as deemed appropriate)	
Species / Habitat	Protection Measures, Cause and Effect Studies and Adaptive Management Requirements
<b>Threatened, Endangered, Candidate, and Proposed Species (Special Status Species) and Associated Habitats</b>	
Black-footed Ferret (E) <i>(Mustela nigripes)</i>	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,14,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY Wyoming State Wildlife Action Plan- 2010 (WY SWAP 2010) Species Accounts p. IV-2-20 to 2-11; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Desert Shrublands p. III-3-8 to 3-10
Greater Sage-Grouse (C) <i>(Centrocercus urophasianus)</i>	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-69 to 1-70; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Desert Shrublands p. III-3-8 to 3-10
	<i>Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate.</i> Instruction Memorandum No. WY-2010-012. December 29, 2009. EMS Transmission: January 4, 2010.
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >
	In order to resolve conflicts with vegetation treatments adjacent to and within the CD-C project area, refer to the nine (9) steps in the <i>Wyoming Guidelines for Managing Sagebrush Communities with an Emphasis on Fire Management</i> (Wyoming Interagency Vegetation Committee 2002:12)
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats.</i> Version 6.0.
Ute Ladies'-Tresses Plant (T) <i>(Spiranthes diluvialis)</i>	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,14,15,17,18,24,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
Colorado River Fish Species: bonytail ( <i>Gila elegans</i> ), Colorado pikeminnow ( <i>Ptychocheilus lucius</i> ), humpback chub ( <i>Gila cypha</i> ), razorback sucker ( <i>Xyrauchen texanus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2b. Summary of references for wildlife protection measures, cause and effect studies, and adaptive management requirements: wildlife and associated habitats, *continued***

Species / Habitat	Protection Measures, Cause and Effect Studies, and Adaptive Management Requirements
<b>BLM Sensitive Species (Plants/Animals) and Associated Habitats</b>	
Bat species: long-eared myotis ( <i>Myotis evotis</i> ), fringed myotis ( <i>Myotis thysanodes</i> ), spotted bat ( <i>Euderma maculatum</i> ), Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP Species Accounts p. IV-2-41, p. IV-2-27, p. IV-2-77 and p. IV-2-84; spotted bat- Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Aspen/Deciduous Forest p. III-1-11 to 1-13, Cliffs-Canyons-Caves and Rock Outcrops p. III-2-8 to 2-10, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	<b>Bat Carcass Survey Protocol, Bat Protection Plan:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . Page 3 and Appendix A. <u>Bat Carcass Survey</u>
	Goodbar, J. R. 1999. Oil and Gas Drilling in Cave and Karst Areas: A Process of Mitigating Impacts. Proceedings of the 1997 Karst and Cave Management Symposium, 13 <sup>th</sup> National Cave Management Symposium, Bellingham, Washington and Chilliwack and Vancouver Island, BC, Canada, October 7-10, 1997. pp. 195-197.
	<b>Acoustic, Carcass, Mortality Surveys:</b> SWCA Environmental Consultants. <i>Avian and Bat Protection Plan for the Spring Valley Wind Energy Facility</i> . 2010. Prepared for Spring Valley Wind LLC, 1600 Smith Street, Suite 4025, Houston, Texas 77002. Prepared by SWCA Environmental Consultants, 7373 Peak Drive, Suite 170, Las Vegas, Nevada 89128.
	Bat Conservation International. Media and Information Literature Database. Literature Library. <a href="http://www.batcon.org">www.batcon.org</a>
	Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP)
Pygmy rabbit ( <i>Sylvilagus idahoensis</i> )	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,15,17,18,26 and 36; RFO Wildlife Attachment
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-2-70; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Aspen/Deciduous Forest p. III-1-11 to 1-13
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >
Wyoming pocket gopher ( <i>Thomomys clusius</i> )	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36; RFO Wildlife Attachment
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-2-97, Desert Shrublands p. III-3-8 to 3-10
	<b>Surveys, Sampling Approach:</b> <i>Bureau of Land Management High Desert District Wildlife and Plant Survey Protocols for Wind Energy Development</i> . Appendix I.
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2b. Summary of references for wildlife protection measures, cause and effect studies, and adaptive management requirements: wildlife and associated habitats, *continued***

Species / Habitat	Protection Measures, Cause and Effect Studies, and Adaptive Management Requirements
White-tailed prairie dog ( <i>Cynomys gunnisoni</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,14,15,17,18,26 and 36
	BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> >
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
Swift Fox ( <i>Vulpes velox</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	WGFD: WY SWAP 2010 Species Accounts, p. IV-2-81; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
Songbird: loggerhead shrike ( <i>Lanius ludovicianus</i> ), sage thrasher ( <i>Oreoscoptes montanus</i> ), Brewer's sparrow ( <i>Spizella breweri</i> ), sage sparrow ( <i>Amphispiza belli</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-29, p. IV-1-112 and p. IV-1-114; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Foothill Shrublands p. III-4-10 to 4-12
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
Shorebirds: white-faced ibis ( <i>Plegadis chihi</i> ), long-billed curlew ( <i>Numenius americanus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-85 and p. IV-1-136, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP)
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
Waterfowl: trumpeter swan ( <i>Cygnus buccinator</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-125, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP)
	Energy Development and Wildlife Conservation in Western North America, David E Naugle 2011.
	Wetlands Regional Monitoring Program Plan 2002, Part 2: Data Collection Protocols Wetland Birds, Wetland Bird Monitoring, Developed by the Bird Focus Group Wetland Regional Monitoring Program
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.



# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2b. Summary of references for wildlife protection measures, cause and effect studies, and adaptive management requirements: wildlife and associated habitats, *continued***

Species / Habitat	Protection Measures, Cause and Effect Studies, and Adaptive Management Requirements
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,14,15,17,18,26 and 36; RFO Wildlife Attachment
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-8, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	<i>Field Protocol for Spatially-Balanced Sampling of Landbird Populations.</i> Hanni, D.J., C.M. White, R.A. Sparks, J.A. Blakesley, G.J. Levandoski, and J.J. Birek. 2010. Unpublished report. Rocky Mountain Bird Observatory, Brighton, CO. 34pp.
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats.</i> Version 6.0.
Ferruginous hawk ( <i>Buteo regalis</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-55; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats.</i> Version 6.0.
Mountain plover ( <i>Charadrius montanus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36; RFO Wildlife Attachment
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-92, Habitat Section-Desert Shrublands p. III-3-8 to 3-10
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats.</i> Version 6.0.
Burrowing owl ( <i>Athene cunicularia</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36; RFO Wildlife Attachment
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-1-33; Habitat Section-Sagebrush Shrublands p. III-9-12 to 9-15, Desert Shrublands p. III-3-8 to 3-10
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats.</i> Version 6.0.
Amphibians: northern leopard frog ( <i>Rana pipiens</i> ), Great Basin spadefoot toad ( <i>Spea intermontana</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-4-9, Habitat Section-Riparian p. III-8-14 to 8-18, Foothill Shrublands p. III-4-10 to 4-12, Wetlands p. III-10-11 to 10-13
	Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP)
	Place water development s and salt and mineral supplements for livestock at least 500 feet from known or potential locations of this plant species (Casper FO RMP 2007)
	Improve floodplain connectivity and function of stream miles (Casper FO RMP 2007).
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats.</i> Version 6.0.
Fish: Colorado River cutthroat trout ( <i>Oncorhynchus clarkii pleuriticus</i> ), roundtail chub ( <i>Gila robusta</i> ), flannelmouth sucker ( <i>Catostomus latipinnis</i> ), and bluehead sucker ( <i>Catostomus discobolus</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts p. IV-3-19, p. IV-3-68, p. IV-3-28 and p. IV-3-3; III-13-17 thru 13-19; Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats.</i> Version 6.0.

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2b. Summary of references for wildlife protection measures, cause and effect studies, and adaptive management requirements: wildlife and associated habitats, *continued***

Species / Habitat	Protection Measures, Cause and Effect Studies, and Adaptive Management Requirements
Meadow milkvetch plant ( <i>Astragalus diversifolius</i> var. <i>diversifolius</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,24,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13 Place water development s and salt and mineral supplements for livestock at least 500 feet from known or potential locations of this plant species (Casper FO RMP 2007)
Cedar Rim thistle plant ( <i>Cirsium aridum</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,24,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Habitat Section-Desert Shrublands p. III-3-8 to 3-10, Cliffs-Canyons-Caves and Rock Outcrops p. III-2-8 to 2-10
Gibbens' beardtongue plant ( <i>Penstemon gibbensii</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,24,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Habitat Section-Desert Shrublands p. III-3-8 to 3-10, Cliffs-Canyons-Caves and Rock Outcrops p. III-2-8 to 2-10
Persistent sepal yellowcress plant ( <i>Rorippa calycina</i> )	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,24,26 and 36 <b>Habitat, Species:</b> WGFD: WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19, Habitat Section-Riparian p. III-8-14 to 8-18, Wetlands p. III-10-11 to 10-13 Place water development s and salt and mineral supplements for livestock at least 500 feet from known or potential locations of this plant species (Casper FO RMP 2007)
<b>Big Game Crucial Winter Range, Migration Corridors, and Associated Habitats</b>	
Big Game Crucial Winter Range	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,9,15,17,18,26 and 36 WGFD: BLM will request data from WGFD <b>Habitat, Species:</b> WGFD: Habitat Section Sagebrush Shrublands p. III-9-12 to 9-15, Foothill Shrublands p. III-4-10 to 4-12, Desert Shrublands p. III-3-8 to 3-10 BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> > WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
Big Game Migration Corridors	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36; RFO Wildlife Attachment <b>Habitat, Species:</b> WGFD: Habitat Section Sagebrush Shrublands p. III-9-12 to 9-15, Foothill Shrublands p. III-4-10 to 4-12, Desert Shrublands p. III-3-8 to 3-10 BLM JIO-PAPO 2012. Pinedale Anticline Project Office, Bureau of Land Management, Pinedale Field Office. < <a href="http://www.wy.blm.gov/jio-papo/papo/index.htm">http://www.wy.blm.gov/jio-papo/papo/index.htm</a> > WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.

# APPENDIX I—WILDLIFE MITIGATION, MONITORING, AND PROTECTION PLAN

**Table I-2b. Summary of references for wildlife protection measures, cause and effect studies, and adaptive management requirements: wildlife and associated habitats, *continued***

Species / Habitat	Protection Measures, Cause and Effect Studies, and Adaptive Management Requirements
<b>Raptors and Associated Habitats</b>	
Raptors (Non-Special Status Species and BLM Sensitive Species)	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-other bird species
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
<b>Songbirds, Waterfowl, and Shorebirds and Associated Habitats</b>	
Songbirds, waterfowl, and shorebirds and associated habitats (Non-Special Status Species and BLM Sensitive Species)	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-other bird species, Habitat Section-Riparian p. III-8-14 to 8-18 – other species
	Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP)
	Place water development s and salt and mineral supplements for livestock at least 500 feet from known or potential locations of this plant species (Casper FO RMP 2007)
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
<b>Amphibians, Reptiles, and Fish and Associated Habitats</b>	
Amphibians, reptiles, and fish and associated habitats (Non-Special Status Species and BLM Sensitive Species)	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,15,17,18,26 and 36; RFO Wildlife Attachment
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-other amphibian, reptile and fish species; WY SWAP 2010 Aquatic Basins p. III-13-17 to 13-19 – other fish species, Habitat Section-Riparian p. III-8-14 to 8-18 – other species
	<i>Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP)</i>
	<i>Place water development s and salt and mineral supplements for livestock at least 500 feet from known or potential locations of this plant species (Casper FO RMP 2007)</i>
	Improve floodplain connectivity and function of stream miles (Casper FO RMP 2007).
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.
<b>General Wildlife Species and Associated Habitats</b>	
General Wildlife Species	BLM 2008a Wildlife and Fisheries p. 2-51 to 2-55; Appendices 1,10,14,15,17,18,26 and 36
	<b>Habitat, Species:</b> WGFD: WY SWAP 2010 Species Accounts, Species of Greatest Conservation Need-crustacean and mollusk species
	Develop water sources for wildlife in coordination with the WGFD and the BLM water Development Handbook {I-1741-0} (Casper FO RMP)
	WGFD. Revised April 2010. <i>Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats</i> . Version 6.0.

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**APPENDIX J: CULTURAL RESOURCES MANAGEMENT**

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### PROGRAM OBJECTIVES

The Bureau of Land Management (BLM) has developed a cultural resources program designed to inventory, evaluate, and manage cultural resources on BLM-administered public land and in areas of BLM responsibility. The BLM management of cultural resources (archaeological, historic, and socio-cultural properties) is in accordance with the provisions of the National Historic Preservation Act (NHPA) of 1966, as amended, and other applicable legislation.

### IDENTIFICATION OF CULTURAL RESOURCES

The BLM requires cultural resource inventories for actions with federal responsibility that include surface disturbance as a part of the action. The purpose of inventories is to identify cultural resources prior to any ground-disturbing activity. This way, sites can be protected through project redesign or other mitigation measures prior to any threat of disturbance. Numerous laws and regulations mandate this policy. For a brief overview of selected laws and policies dictating BLM's treatment of cultural resources, please see the end of this appendix.

Three classes of cultural resource inventory have been established; Class III is the most intensive.

**Class I** inventories are completed with the use of existing data from cultural resource inventory files maintained by both the BLM and the Wyoming State Historic Preservation Office (SHPO). Class I inventories are conducted at two different levels: at the planning stage of an environmental impact statement (EIS) to produce a regional overview; and at the site-specific level for individual proposed projects to determine if previous cultural resource inventories have been conducted within the area of potential effect (APE). The purpose of Class I inventories is to provide cultural resource specialists and managers with an informed basis for understanding the nature of the archaeological record within the area in question.

**Class II** inventories are statistically-based sample surveys designed to aid in characterizing the probable density, diversity, and distribution of cultural properties in the area, to develop and test predictive models, and to answer appropriate research questions. Within individual sample units, survey aims, methods, and intensity are the same as those applied in a Class III survey. Class II surveys may be conducted in several phases, using different sample designs, to improve statistical reliability.

**Class III** intensive field surveys are conducted by professionals through pedestrian survey of an entire target area. The intent of a Class III inventory is to locate and record all historic properties and is consistent with standards in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716). Class III inventories conform to the prevailing professional survey standards for the region involved, provided that the regional standards meet or exceed the Secretary's Standards and Guidelines. Because a Class III survey is designed to produce a total inventory of the cultural properties observable within the target area, once it has been completed, no further survey work should be needed in the target area as long as the current standards are met. Areas with a high probability of containing buried cultural materials or known cultural materials may require additional work or professional monitoring and/or data recovery excavations. Areas that require additional work are analyzed on a case-by-case basis, depending on the proposed action and the types of cultural resources present in the project area.



## BLM JURISDICTION ON PRIVATELY OWNED AND/OR SPLIT-ESTATE LANDS (including the checkerboard land pattern)

### Survey

The BLM frequently authorizes permits and rights-of-way, or provides approvals for actions on federal lands in which portions of the overall project may take place on non-federal lands or the federal action may have contingent or cumulative effects on non-federal lands. Before the BLM can authorize (through permit, license, etc.) any project that may adversely affect significant cultural resources (i.e., historic properties), the BLM has the legal responsibility to take into account the effects of its actions on these resources. In order for the BLM to fully consider the effects of its actions, it also has the responsibility to gather the information necessary to know what cultural resources may be affected, evaluate the resources for eligibility for inclusion in the National Register of Historic Places, and mitigate adverse affects to historic properties where possible.

If a project requires the use of federally-owned surface lands as well as privately owned surface lands, there are two authorities that require federal agencies to apply the same NHPA Section 106 compliance standards to private lands as they do to federal lands. The regulations at 36 CFR, Part 800.4(b) require the federal agency to "take the steps necessary to identify historic properties within the area of potential effect." That this includes both federal and non-federal lands is implicit throughout the statute and the regulations, since the regulatory definition of "area of potential effect" is "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties" [36 CFR, Part 800.16(d)]. It makes no distinction between federal and non-federal lands. More explicit, however, is Executive Order No. 11593, entitled "Protection and Enhancement of the Cultural Environment." Section 1(3) of the EO states that all federal agencies: "... in consultation with the Advisory Council on Historic Preservation, institute procedures to assure that federal plans and programs contribute to the preservation and enhancement of *non-federally owned* sites, structures and objects of historical, architectural, or archaeological significance." The BLM's responsibility for inventory, evaluation, and protection of cultural properties on lands outside BLM administrative jurisdiction is limited according to the degree to which the Field Manager's decisions determine or control the location of surface-disturbing activities on those lands.

BLM makes this policy known to project proponents, who in turn are responsible for providing all of the information the BLM requires for making informed decisions. If cultural resource data is lacking from private lands so that the BLM authorized officer cannot make an informed decision, the BLM cannot allow the undertaking to proceed. Thus, it is the responsibility of the project proponent to acquire the appropriate information.

Within the checkerboard land pattern that encompasses much of the planning area, Wyoming BLM has set forth the policy that the entire project area, if it covers any federal lands, must be inventoried. The reasoning for this is that the distances between federal ownership and private ownership are so short, that the potential for the federal portion to not dictate the placement of the project on private is remote.

Split estate lands are defined as those lands where surface ownership transferred to private landowners from the federal government but the mineral rights were retained by the federal government. These situations arose either through patent under the 1914 amendment to the Homestead Act or purchase under the Stock-raising Act of 1916. Each of these Acts also allowed for the federal government to "reenter and occupy so much of the surface ... as may be required for all purposes reasonably incident to the mining or removal of coal or other minerals." At the time of purchase, the buyer agreed to these terms. Since compliance with the NHPA Section 106 process is required of a federal agency by statute and regulation

## APPENDIX J—CULTURAL RESOURCE MANAGEMENT

prior to the federal action, then being able to complete that process is a purpose reasonably incident to the extraction of the minerals.

### Site Management

As stated above, BLM has multiple authorities for requiring cultural resource inventories on private lands. This jurisdiction only holds forth with federal undertakings. Cultural resources that are located on private lands are recorded for the permanent record and appropriate mitigation measures are applied, in consultation with the private landowner. This jurisdiction comes from the requirement that the federal agency must take into account its effects on all historic properties. Once the federal undertaking has been fully processed, the federal responsibility for an historic property is completed. The historic property remains under the ownership of the landowner, thus BLM has no control over the historic property outside of the venue of a federal undertaking.

### Evaluation of Cultural Resource Sites

#### Criterion for Eligibility

The BLM evaluates the significance of cultural resources identified during inventory in consultation with the Wyoming SHPO to determine if the resources are eligible for inclusion in the National Register of Historic Places (NRHP). Cultural resource properties may be considered eligible for listing in the National Register if they meet one or more of the following criteria identified in 36 CFR 60.4:

- **Criterion A.** An historic property is associated with an event or events that have made a significant contribution to the broad patterns of America's history.
- **Criterion B.** An historic property is associated with the lives of persons significant to our past.
- **Criterion C.** An historic property embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic value or represents a significant and distinguishable entity whose components may lack individual distinction.
- **Criterion D.** An historic property has yielded or may be likely to yield information important in prehistory or history.

To facilitate evaluation of cultural resource values in Wyoming, the BLM has devised guidelines for determining the eligibility of archaeological and historical sites and historic trails (BLM Manual 8110.32). The guidelines supplement the National Register criteria for evaluation (36 CFR 60.4) and provide consistency across all BLM jurisdictions. Application of the guidelines ensures that significant cultural resources are recognized and managed accordingly.

#### Aspects of Integrity

Integrity is the ability of a property to convey its significance. To be listed in the National Register of Historic Places, a property must not only be shown to be significant under the National Register criteria, but it also must have integrity. The evaluation of integrity is sometimes a subjective judgment, but it must always be grounded in an understanding of a property's physical features and how they relate to its significance.

Historic properties either retain integrity (this is, convey their significance) or they do not. Within the concept of integrity, the National Register criteria recognizes seven aspects or qualities that, in various combinations, define integrity.

## APPENDIX J—CULTURAL RESOURCE MANAGEMENT

To retain historic integrity a property will always possess several, and usually most, of the aspects. The retention of specific aspects of integrity is paramount for a property to convey its significance. Determining which of these aspects are most important to a particular property requires knowing why, where, and when the property is significant.

- **Location.** The place where the historic property was constructed or the place where the historic event occurred.
- **Design.** The combination of elements that create the form, plan, space, structure, and style of a property.
- **Setting.** The physical environment of an historic property.
- **Materials.** The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form an historic property.
- **Workmanship.** The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- **Feeling.** The property's expression of the aesthetic or historic sense of a particular period of time.
- **Association.** The direct link between an important historic event or person and an historic property.

### Contributing and Non-Contributing to NRHP Eligibility

Properties that encompass large areas can be deemed to have contributing and noncontributing portions. Contributing portions are seen to retain integrity of the values for which the property is considered eligible for the NRHP. Non-contributing portions are identified portions of the property which are not deemed to retain the integrity of values which would render the property eligible for the NRHP. The determination of contributing versus noncontributing portions of an eligible property can be made at any time after adequate evaluation has been conducted.

Historic trails including the Overland and Cherokee, the Rawlins to Fort Washakie Freight Road, and the Rawlins to Baggs Freight Road, are considered eligible for the National Register under Criterion A. However, some portions of the trails no longer retain the aspects of integrity necessary for eligibility. As there have been no encompassing inventories of entire trails within the Resource Management Plan Planning Area (RMPPA), portions of trails are evaluated to determine if they contribute to the eligibility of the property on a case-by-case basis. Trail segments are evaluated pursuant to the National Register criteria of integrity (location, design, setting, materials, workmanship, feeling, and association). If a predominance of criteria are met, the segment will be considered contributing to the properties' overall NRHP eligibility.

### BLM Use Allocations

After determination of eligibility, significant cultural resource properties are further evaluated for assignment to one or more use categories. The BLM has established six use categories as follows:

- **Scientific Use.** This category applies to any cultural property determined to be available for scientific or historical study using currently available research techniques, including methods that would result in the property's physical alteration or destruction. Recommendations to allocate individual properties to this use must be based on documentation of the kinds of data the property is thought to contain and the data's importance for pursuing specified research topics.
- **Conservation for Future Use.** A cultural property included in this category is deemed worthy of segregation from all other land or resource uses, including cultural resource uses, which threaten the maintenance of its present condition or setting, and will remain in this use category until specified provisions are met in the future.

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- **Traditional Use.** This category is to be applied to any cultural resource known to be perceived by a specified social and/or cultural group as important in maintaining the cultural identity, heritage, or well being of the group. Cultural properties assigned to this category are to be managed in ways that recognize the importance ascribed to them and seek to accommodate their continuing traditional use.
- **Public Use.** This category may be applied to a cultural property found to be appropriate for use as an interpretive exhibit in place, or for related educational and recreational uses by members of the general public.
- **Experimental Use.** This category may be applied to a cultural property judged well suited for controlled experimental study, to be conducted by BLM or others, concerned with the techniques of managing cultural properties, which would result in the property's alteration, possibly including loss of integrity and destruction of physical elements. It should not be applied to cultural properties with strong research potential, traditional cultural importance, or good public use potential, if it would significantly diminish those uses.
- **Discharged from Management.** This category is assigned to cultural properties that have no remaining, identifiable use. Most often these are prehistoric and historic archaeological properties, such as small surface scatters of artifacts or debris, whose limited research potential is effectively exhausted as soon as they have been documented. Properties discharged from management remain in the inventory, but they are removed from further management attention and do not constrain other land uses.

When a cultural resource property is assigned to one or more use categories, a decision is made pertaining to the management of that property. The criteria and guidelines for the evaluation of cultural resources and the assignment of significant cultural resource properties to specific use categories would remain unchanged under all the alternatives addressed in this plan.

### Determinations of Effect

Once the eligibility of an historic property has been determined, the BLM must then determine the effects a proposed undertaking may have on a cultural resource. Standard measures for reducing effects are to be considered part of the project design. Determination of effect must be made after standard treatment measures and best management practices (BMP) have been integrated into the project design. The final project design must incorporate all agreed upon treatment measures and be included in the Conditions of Approval or components of the Surface Use Plan, Plan of Operations, or Plan of Development.

**No Historic Properties Affected.** If no cultural resource sites eligible for listing in the NRHP are present in the proposed project area, there are historic properties present but the undertaking will have no effect upon them, or a proposed project will not be visible from an historic property or there is no contrast between the project and the setting, the BLM will find that the undertaking has no potential to affect historic properties.

**No Historic Properties Adversely Affected.** If a proposed project will cause effects to an historic property, but the effects will not diminish the aspects of integrity nor the characteristics that make the property eligible for listing in the National Register of Historic Places, only noncontributing portions of historic properties will be affected, or if setting is an important aspect of integrity for an historic property and the project will cause a weak contrast, the BLM will find that the undertaking has no potential to adversely affect historic properties.

**Historic Properties Adversely Affected.** An adverse effect is found when an undertaking may alter, directly, or indirectly, any of the characteristics of an historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of an historic property, including those that may have been identified

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subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

### **Consultation**

#### **SHPO Consultation**

According to the Programmatic Agreement between the Advisory Council on Historic Preservation (ACHP) and the BLM, the BLM is required to consult with the Wyoming SHPO on eligibility and effects to each cultural property. The Wyoming BLM and Wyoming SHPO have developed a Protocol for consultation that serves to streamline the process and reduce consultation time frames from the guidelines set forth in the 36 CFR 800 regulations. Under the Protocol between the Wyoming BLM and the Wyoming SHPO, those sites recommended as Eligible for listing under Criteria A, B, or C or the setting is an important aspect of integrity requiring case-by-case consultation with the Wyoming SHPO. Additionally, the BLM has implied concurrence for determining eligibility and effects for sites eligible for listing under Criterion D of the NHPA. Determination of effects to sites follows the criteria outlined in 36 CFR 800.5.

#### **Native American Consultation**

In addition to consultation with the Wyoming SHPO office, the BLM conducts Native American Consultation in compliance with Section 106 of the NHPA, the American Indian Religious Freedom Act of 1978, and Executive Order No. 13007. The BLM has created a process for conducting Native American consultation for federal undertakings, as described in BLM Manual 8120 and BLM Manual H-8120-1. The BLM has worked extensively with tribes known to inhabit the region to establish a protocol for consultation. Consultation with Native American tribes occurs during the planning process of environmental impact statements and when individual projects are proposed that may impact properties that have traditional use (i.e., Traditional Cultural Properties [TCPs]) or are sacred to Native American cultures. When one of these site types is identified within proximity to a proposed undertaking, the project proponent and tribal governments are notified. Determinations of eligibility and effects the project may have on the site are determined in consultation with tribal representatives. The BLM does not authorize any undertaking that has the potential to affect TCPs or Native American Sacred Sites without first consulting with tribes. The likelihood of inadvertently affecting a TCP or sacred site is low because of the established protocols BLM has developed with tribal representatives.

#### **Interested Parties**

The BLM will solicit such input through the public participation opportunities afforded by BLM's land use planning and environmental review processes established under the National Environmental Policy Act (NEPA) of 1969 and the Federal Land Policy and Management Act (FLPMA) of 1976, and in accordance with regulations at 43 CFR Part 1610.3. Interested parties shall be invited to participate in the Section 106 consultation process if they have a demonstrated interest in a BLM undertaking or action on historic properties. Such interested parties may include, but are not limited to, local governments, grantees, permittees, owners of affected lands or land surfaces, Indian tribes, and other interested parties determined jointly by BLM and SHPO.

In making determinations of effect, BLM may request comments of interested parties. When BLM makes a determination of adverse effect, they will request comments of interested parties. BLM will maintain lists of interested parties based on their identified interests.

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BLM and SHPO will consult to identify invited concurring parties based on their demonstrated interest and level of participation. Invited concurring parties will be provided the opportunity to sign a Memorandum of Agreement or Programmatic Agreement. Refusal by an invited concurring party to sign an agreement will not invalidate the agreement.

### **Management of Cultural Resources**

Management objectives for significant cultural resource values provide a direct link between the assignment of properties to use categories and the achievement of the cultural resource program objectives. The basic management objectives for significant cultural resource values would remain unchanged under all of the alternatives addressed in this plan.

Specific management actions that could be taken to achieve these objectives at selected significant properties are described in the discussions of the various alternatives. Management objectives for significant properties that have not yet been identified or for which inventory data are insufficient as of this writing will remain unchanged, but management actions for these properties will be prescribed on a case-by-case basis and will be addressed in amendments to this plan when appropriate.

### **Standard Protective Measures**

Within the framework described above, the BLM has developed protective measures to minimize adverse effects (as defined in 36 CFR 800.5[1]) on significant cultural resource values. Protective measures are used in response to the proposed actions of BLM programs involving surface disturbance. These measures include cultural resource inventories, evaluation of cultural resources located during inventory, setting assessments where applicable, best management practices and mitigation of potential adverse impacts on significant cultural resources.

A setting assessment is used to determine what physical features of a proposed undertaking will be visible from an historic property for which setting is an important aspect of integrity. Visibility of undertakings will vary. The scale of visual analysis should be commensurate with the scale of the undertaking. In the majority of cases, undertakings will not be seen beyond three miles; pipelines, fiber-optic and other ground level disturbance will not likely be seen beyond a mile. In rare cases, undertakings may be seen beyond five miles if they are unusually large or are skylined on the horizon, such as wind turbines and communication towers.

A setting assessment can also be used to determine whether a proposed undertaking will introduce audible elements to the historic property where setting is an important aspect of integrity. These proposed undertakings may include compressor stations, pumping stations, or wind turbines. An assessment of the existing audible elements will be documented and then the BLM archaeologist will work with the project proponent to ensure new audible elements do not result in an adverse effect. Best management practices and mitigation measures will be utilized to achieve this goal.

### **Best Management Practices**

In situations where a proposed undertaking has the potential to affect the physical integrity of an historic property, there are numerous measures that can be applied to reduce or eliminate the effects. BLM archaeologists work with the contracting archaeologist and the project proponent to determine which practice would best suit the needs of all parties. Application of BMPs is dependent upon the nature of the undertaking, and the nature of the historic property.

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**Avoidance.** Avoidance, through modification of the proposed undertaking, is the primary and preferred measure used to protect cultural resources. This can be accomplished at the project planning stage.

**Monitoring.** In situations where avoidance of adverse affects is not feasible, or there is a determination of no adverse effects, but the potential remains for adverse effects through inadvertent discovery, a BLM permitted archaeologist will monitor construction activities. The presence of a monitor is to ensure that buried cultural materials are immediately identified and that construction activities in that area are halted to avoid further impacts to the site. Prior to BLM authorization of the project, the project proponent submits a discovery plan to the BLM for review which outlines the way in which cultural resources will be treated and the responsibilities of the project proponent. This plan is reviewed by BLM archaeologists and submitted to SHPO for concurrence. In the case where monitoring results in a discovery situation, the discovery plan is enacted. Depending on the nature of the discovery the project may be allowed to proceed, redesigned, or data recovery may be required.

**Standard Measures to Reduce Visual Contrast.** When a proposed project is found to be within the contributing setting of an historic property, an assessment of potential impacts is conducted through viewshed analysis, on-site inspection, and photo inspection. For historic trails such as the Cherokee Trail, Overland Trail, Rawlins to Fort Washakie Road and Rawlins to Baggs Road, protection measures would be carried out similar to other historic properties if any project were found to be located within a quarter mile of a contributing portion of the historic trail. When a proposed project is outside of the quarter mile buffer of the trail, but found to be within the viewshed that contributes to NRHP eligibility, analyses of potential impacts to the integrity of the setting would be carried out in the same way as other properties where setting is an aspect of integrity. Best management practices used to ensure that the contributing viewshed of historic properties are not adversely affected include:

- Consolidating project facilities among oil and gas developers—this also facilitates cumulative analysis.
- Developing coordinated road and pipeline systems.
- Reducing the amount of surface development by consolidating facilities (e.g., develop bottom hole wells using directional drilling from a single surface well location).
- Using low profile facilities.
- Proper sighting and location to maximize the use of topography and vegetation to screen development. Design projects to blend with topographic forms and existing vegetation patterns.
- Using environmental coloration or advance camouflage techniques to break up visual intrusion of facilities that cannot be completely hidden.
- Using broken linear patterns for road developments to screen roads as much as possible. This can include feathering or blending of the edges of linear rights-of-way to break up the linearity.
- For livestock control, using electric fencing with low-visibility fiberglass posts and environmental colors (e.g., sage green).
- Designing linear facilities and seismic lines to run parallel to key observation points rather than perpendicular.
- Modifying the orientation of facilities to present less of a visual impact (e.g., a facility with several tanks lined up so that one obscures the visibility of the others).

### Mitigation

Mitigation measures are determined by the types of proposed actions, the nature of the potential effect and the qualities of the historic property that render it eligible for NRHP listing. Mitigation measures are applied when best management practices will not reduce or minimize adverse effects. Mitigation may include data recovery. Consultation with the Wyoming SHPO and the ACHP is required when proposed

## APPENDIX J—CULTURAL RESOURCE MANAGEMENT

actions are expected to adversely affect properties eligible for the National Register and mitigation is determined to be the best course of action.

**Data Recovery.** There are two times during a project that data recovery may be implemented. The first is when it is determined prior to project construction that there will be an adverse effect to an NRHP eligible property. The project proponent, the BLM, and the SHPO work together to develop a data recovery plan which will mitigate the adverse effects. The second is after a discovery situation when it is determined that the project has already adversely impacted an historic property. Again, the project proponent, BLM authorized officer, and SHPO work to develop a plan that mitigates all effects of the construction. Data recovery in itself is a destructive process, thus it must be carried out in a way to successfully retrieve all pertinent information from the site.

### **HABS/HAER (Historic American Buildings Survey/Historic American Engineering Record).**

HABS/HAER documentation as a mitigation measure may be implemented if no other mitigation measure would adequately minimize the adverse effect. This documentation includes large format photography, drawings, and research of the property to document all aspects of the property prior to adverse effects.

**Agreement Documents.** In situations where data recovery or HABS/HAER documentation is not appropriate to mitigate adverse effects or multiple historic properties will be affected by a single undertaking, the BLM will work with the SHPO and the project proponent to develop an agreement document. Depending on the nature of the undertaking, this may result in a Memorandum of Agreement (MOA) or a Programmatic Agreement (PA). The agreement document will outline the manner in which adverse effects will be mitigated, and the roles and responsibilities of each signatory. The agreement document stays in effect until all measures have been completed to the satisfaction of all parties.

## **Cultural Resource Laws and Regulations**

**American Antiquities Act of 1906** provides for permits to authorize scholarly use of properties, for misdemeanor-level penalties to control unauthorized use, and for presidential designation of outstanding properties as national monuments for long-term preservation.

### **National Historic Preservation Act of 1966**

- Section 106 directs all federal agencies to take into account effects of their undertakings (actions and authorizations) on properties included in or eligible for the NRHP.
- Section 110 sets inventory, nomination, protection, and preservation responsibilities for federally owned cultural properties. Section 110 (c) requires each federal agency to designate a Preservation Officer to coordinate activities under the act.

**American Indian Religious Freedom Act of 1978** establishes the policy of the United States to protect and preserve for the American Indian, Eskimo, Aleut, and Native Hawaiian the inherent right of freedom to believe, express, and exercise their traditional religions. Federal agencies are directed to evaluate their policies and procedures to determine if changes are needed to ensure that such rights and freedoms are not disrupted by agency practices.

**Archaeological Resources Protection Act of 1979** provides felony-level penalties for the unauthorized excavation, removal, damage, alteration, defacement, or the attempted unauthorized removal, damage, alteration, or defacement of any archaeological resource, more than 100 years of age, found on public lands or Indian lands. The act also prohibits the sale, purchase, exchange, transportation, receipt, or offering of any archaeological resource obtained from public lands or Indian lands.



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**Native American Graves Protection and Repatriation Act of 1990** requires Native American consultation for the excavation and/or removal of "cultural items" including human remains, funerary objects, sacred objects, and objects of cultural patrimony. Consultation is also required if "cultural items" are discovered during land use activities.

**Executive Order No. 13007: Indian Sacred Sites** establishes access to and ceremonial use of Indian sacred sites by Indian religious practitioners on federal lands. The federal agencies shall avoid adversely affecting the physical integrity of such sacred sites and maintain confidentiality of said sites.

## APPENDIX K: HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
409	Monoethanolamine	141-43-5		
	n-Alkyl (C12-16) Dimethylbenzyl	68424-85-1		
	Ammonium Chloride			
	n-Propoxypropanol	1569-01-3		
Acfrac Ceramax E	Crystalline Silica, Quartz	14808-60-7		
	Mullite	1302-93-8		
	Phenol/Formaldehyde resin	9003-35-4		
Adhesive, Polyguard 600 Liquid	Methyl Ethyl Ketone	78-93-3	U159	5,000
	Mineral Spirits	64742-88-7		
	Toluene	108-88-3	U109	10
Ajax, Oxygen Bleach Cleaner	Calcium Carbonate	471-34-1		
	Crystalline Silica	14808-60-7		
Amoco 300 Motor Oil SAE 30	MSDS Not Found	None		
Antifreeze 60/40 premix	Ethylene Glycol	107-21-1	None	5,000
	Diethylene Glycol	111-46-6		
AntiSeize Special Lubricating Compound 18014	Aluminum (as dust or fume)	7429-90-5		
	Copper (as dust or fume)	7440-50-8	None	5,000
	Graphite	7782-42-5		
	Petroleum Oil	64742-65-0		
BA-20 Buffering Agent	Acetic Acid	64-19-7	None	5,000
	Ammonium Acetate	631-61-8	None	5,000
BA-40L Buffering Agent	Potassium Carbonate	584-08-7		
Barite	Barium Sulfate	7727-43-7		
	Crystalline Silica, Quartz	14808-60-7		
Barite (Barium Sulfate, MI Bar)	MSDS Not Found	None		
Base, Belzone 1221 Super-E Metal	MSDS Not Found	None		
Battery Cleaner #80369	2-Butoxyethanol	111-76-2		
	Butane	106-97-8		
	Propane	74-98-6		
	Water	7732-18-5		
BC-140	Boric Acid	10043-35-3		
	Ethylene Glycol	107-21-1	None	5,000
	Monoethanolamine	141-43-5		
BE-5 Microbiocide	2-Methyl-4-Isothiazoline-3-one	2682-20-4		
	5-Chloro-2-Methyl-4-Isothiazolin-3-one	26172-55-4		
	Crystalline Silica, Quartz	14808-60-7		
	Diatomaceous Earth	61790-53-2		
	Magnesium Chloride	7786-30-3		
	Magnesium Nitrate	10377-60-3		
	2-Bromo-2-nitro-1,3-propanediol	52-51-7		
Big D Deodorant Urinal Screens	MSDS Not Found	None		
Bleach	Sodium hydroxide	1310-73-2	None	1,000
	Sodium hypochlorite	7681-52-9	None	100
Boothill Paraffinized Pellets	Bromadiolone	28772-56-7		
Borax Powdered Hand Soap	Sodium Borate Decahydrate (Borax)	1303-96-4		
	Sodium Soap	67701-11-5		

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Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Bowl Cleaner, #2300	Hydrogen Chloride	7647-01-0	None	5,000
	Quaternary Ammonium Chloride	111-76-2		
	Water	7732-18-5		
Brake Parts Cleaner II, Misty A-00734	Acetone	67-64-1	U002	5,000
	Hexane	110-54-3		
Breakthrough (Washbay Pressure Washer Soap)	MSDS Not Found	None		
C9721A Toner	Copper Compund	Trade Secret		
	Styrene Acrylate Copolymer	Trade Secret		
	Wax	Trade Secret		
Calcium Chloride	Calcium Chloride	010043-52-4		
Calcium Chloride Solution	Calcium Chloride	010043-52-4		
Cal-Seal 60	Calcium Sulfate	None		
CarboHSP (Ceramic Proppant)	Corundum	1302-74-5		
	Mullite	1302-93-8		
Carbon Dioxide	Carbon Dioxide	124-38-9		
CarboProp	Corundum	1302-74-5		
	Mullite	1302-93-8		
CAT-3 Activator	EDTA/Copper Chelate	None		
CAT-3WB	EDTA/Copper Chelate	None	U154	5,000
	Methanol	67-56-1		
CAT-4	Diethylenetriamine	111-40-0		
CAT-4 (Amine)	MSDS Not Found	None		
Caustic Soda (Sodium Hydroxide)	Sodium hydroxide	1310-73-2	None	1,000
Cedar Fiber (Shredded Cedar, Cellulose)	MSDS Not Found	None		
Cement- Class G	Crystalline Silica, Quartz	14808-60-7		
	Portland Cement	65997-15-1		
CFR-2 Red Label (Cement Friction Reducer)	Polyvinylpyrrolidone	9003-39-8		
	Sulfonated Organic Salt Condensate	None		
CFR-3 (Cement Friction Reducer)	Sodium Formate	141-53-7		
	Sulfonic Acid Salt	None		
Chevron Delco 400 SAE 30/40 Motor Oil	Highly Refined Mineral Oil	Mixture		
	Zinc Alkyl Dithiophosphate	68649-42-3		
Chevron HDAX Low Ash Gas Engine Oil SAE 40	Highly Refined Mineral Oil	Mixture		
Chevron Hydraulic Oil AW ISO 32	Highly Refined Mineral Oil	Mixture		
Chevron Rykon AW ISO 10	Highly Refined Mineral Oil	Mixture		
Chevron SRI Grease NLG2	Highly Refined Mineral Oil	Mixture		
CI-25 (Inhibitor- Acid)	MSDS Not Found			
CL-11 Crosslinker	Isopropanol	67-63-0		
	Titanium Complex	None		
CL-22 Crosslinker	Borate Salts	None	U154	5,000
	Diesel	68476-34-6		
	Methanol	64-56-1		
CL-22M Crosslinker	Diesel	68476-34-6		
	Ulexite	1319-33-1		
CL-23 Crosslinker	Ammonium Chloride	12125-02-9	None	5,000
CL-28M Crosslinker	Zirconium Complex	None		

## APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
CL-29 Crosslinker	Formic Acid	64-18-6	U123	5,000
	Lactic Acid	10326-41-7		
	Tetraethylenepentamine	112-57-2		
	Zirconium Complex	None		
CL-31 Crosslinker	Potassium Hydroxide	1310-58-3	None	1,000
	Potassium Metaborate	13709-94-9		
Cla-Sta XP Additive	Polyepichlorohydrin, trimethyl amine quaternized	51838-31-4		
Clayfix-II Material	Alkylated Quaternary Chloride	None		
Cleaner/Degreaser, Belzona 9111	MSDS Not Found	None		
Compressed Gas, 25% Methane, 21% O <sub>2</sub> , N <sub>2</sub>	Methane	74-82-8		
	Nitrogen	7727-37-9		
	Oxygen	7782-44-7		
Condensate	Mixture of aliphatic hydrocarbons of carbon number >=4	Mixture		
	Benzene	71-43-2		
	Hydrogen Sulfide	7783-06-4		
	Natural Gas	8006-14-2		
	n-Hexane	110-54-3		
D-Air 3000L	Alkenes	None		
	Silica, amorphous precipitated	67762-90-7		
DAP Weldwood Contact Cement	Aliphatic Petroleum Distillate	64742-89-8	U159 U109	5,000 10
	Methyl Ethyl Ketone	78-93-3		
	Toluene	108-88-3		
Dawn	Monoethanolamine	141-43-5		
D-CON Ready Mixed Baits	MSDS Not Found	None		
Degreaser, Heavy Duty (Aerosol #03095)	1,2-Butylene Oxide	106-88-7	U210 U228	100 100
	Carbon Dioxide	124-38-9		
	Tetrachloroethylene (PERC)	127-18-4		
	Trichloroethylene (TCE)	79-01-6		
Delvac 1210 Motor Oil SAE 10W	Phosphorodithioic Acid, O, O-DI-C1-14-Alkyl Esters, Zinc Salt (2:1) ZDDP	68649-42-3		
Diacel LWL	Cellulose derivative	None		
Diesel Fuel	Diesel	68476-34-6		
Doc-3 Surfactant	Imidazoline	None		
	Isopropanol	67-63-0		
Dual Spacer	Aluminum Oxide	1344-28-1		
	Crystalline Silica, Quartz	14808-60-7		
	Diatomaceous Earth	61790-53-2		
	Silica, amorphous-diatomaceous Earth	68855-54-9		
Econolite Additive	Sodium Metasilicate, Anhydrous	6834-92-0		
Econoprop Proppant	Aluminum Silicate	1302-76-7		
	Crystalline Silica, Cristobalite	14464-46-1		
Electro Wash 2000	Ethanol	64-17-5	U112	5,000
	Ethyl Acetate	141-78-6		
	Isopropanol	67-63-0		
	Naphtha	64741-66-8		
Enamel, Cote All (Yellow, Red, Neutral)	Crystalline Silica	14808-60-7	None	1,000
	Ethyl Benzene	100-41-4		
	Mineral Spirits	64742-48-9		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Enamel, Engine Black #203	Butane	106-97-8		
	Carbon Black	1333-86-4		
	Dimethyl Ketone	67-64-1	U002	5,000
	Ethyl 3-Ethoxypropionate	763-69-9		
	Ethyl Acetate	141-78-6	U112	5,000
	Ethylbenzene	100-41-4	None	1,000
	Methyl Ethyl Ketone	78-93-3	U159	5,000
	Propane	74-98-6		
	Proprietary Resin	None		
	Xylene (W/ Anti-Static)	1330-20-7	U239	100
Enamel, Gloss Gray 610 Series 2	Alkyd Resin	None		
	Alkyd Resin Titanium Dioxide (total dust)	13463-67-7		
	Aluminum Oxides	1344-28-1		
	Amorphous Silica	7631-86-9		
	Mineral Spirits as Stoddard Solvent	8052-41-3		
Enamel, Gloss Protective Blue #7722830	1,2,4-Trimethylbenzene	95-63-6		
	Acetone	67-64-1	U002	5,000
	Aliphatic Hydrocarbon	64742-89-8		
	Aromatic Hydrocarbon	64742-95-6		
	Aromatic Solvent	64742-95-6		
	Ethylbenzene	100-41-4	None	1,000
	Ethylene Glycol Monobutyl Ether	111-76-2		
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	N-Butyl Acetate	123-86-4	None	5,000
	Pigment Black 7	1333-86-4		
	Pigment Red 122	980-26-7		
	Pigment Violet 32	12225-08-0		
	Propylene Carbonate	108-32-7		
	Stoddard Solvent	8052-41-3		
	Titanium Dioxide	13463-67-7		
	Toluene	108-88-3	U109	10
	Xylene	1330-20-7	U239	100
Enamel, Industrial Tough Coat, OSHA Blue # 1510	1-Methoxy-2-Propanol Acetate	108-65-6		
	Acetone	67-64-1	U002	5,000
	Butane	106-97-8		
	Ethylbenzene	100-41-4	None	1,000
	Methyl Ethyl Ketone	78-93-3	U159	5,000
	Methyl Isobutyl Ketone	108-10-1	U161	5,000
	Propane	74-98-6		
	Titanium Dioxide	13463-67-7		
	Xylene	1330-20-7	U239	100
Enamel, Industrial Tough Coat, OSHA Red #2116	1-Methoxy-2-Propanol Acetate	108-65-6		
	Acetone	67-64-1	U002	5,000
	Butane	106-97-8		
	Ethylbenzene	100-41-4	None	1,000
	Methyl Ethyl Ketone	78-93-3	U159	5,000
	Methyl Isobutyl Ketone	108-10-1	U161	5,000
	Propane	74-98-6		
	Xylene	1330-20-7	U239	100

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Enamel, Industrial Yellow, 944300, 9444402, 944504	Calcium Aluminum Silicate	1332-58-7		
	Magnesium Silicate	14807-96-6		
	Pigment Black 7	1333-86-4		
	Pigment Orange 5	3468-63-1		
	Pigment Red 3	2425-85-6		
	Pigment Yellow 74	6358-31-2		
	Stoddard Solvent	8052-41-3		
Enamel, Interior-Exterior (Tile Gray #71)	Titanium Dioxide	13463-67-7		
	(As Nuisance Particulates)	1317-80-2		
	(As Nuisance Particulates)	37244-96-5		
	Carbon Black	1333-86-4		
	Sodium Potassium Aluminum Silicate	37244-96-5		
Enamel, Metallic (Silver) 400	Titanium Dioxide	1317-80-2		
	Acetone	67-64-1	U002	5,000
	Aliphatic Hydrocarbon Solvent	64742-89-8		
	Ethylbenzene	100-41-4	None	1,000
	Mineral Spirits	64742-88-7		
	Propane	74-98-6		
	Toluene	108-88-3	U109	10
	V. M. & P. Naphtha	64742-89-8		
Enamel, Premium Gloss Protective Blue #7727830	Xylene	1330-20-7	U239	100
	1,2,4-Trimethylbenzene	95-63-6		
	Acetone	67-64-1	U002	5,000
	Aliphatic Hydrocarbon	64742-89-8		
	Aromatic Hydrocarbon	64742-95-6		
	Aromatic Solvent	64742-95-6		
	Ethylbenzene	100-41-4	None	1,000
	Ethylene Glycol Monobutyl Ether	111-76-2		
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	N-Butyl Acetate	123-86-4	None	5,000
	Pigment Black 7	1333-86-4		
	Pigment Red 122	980-26-7		
	Pigment Violet 32	12225-08-0		
	Propylene Carbonate	108-32-7		
	Stoddard Solvent	8052-41-3		
	Titanium Dioxide	13463-67-7		
	Toluene	108-88-3	U109	10
	Xylene	1330-20-7	U239	100
Enamel, Premium Gloss Protective Blue # 7724830	1,2,4-Trimethylbenzene	95-63-6		
	Acetone	67-64-1	U002	5,000
	Aliphatic Hydrocarbon	64742-89-8		
	Aromatic Hydrocarbon	64742-95-6		
	Aromatic Solvent	64742-95-6		
	Ethylbenzene	100-41-4	None	1,000
	Ethylene Glycol Monobutyl Ether	111-76-2		
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	N-Butyl Acetate	123-86-4	None	5,000
	Pigment Black 7	1333-86-4		
	Pigment Red 122	980-26-7		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Enamel, Premium Gloss Protective Blue # 7724830, continued	Pigment Violet 32	12225-08-0		
	Propylene Carbonate	108-32-7		
	Stoddard Solvent	8052-41-3		
	Titanium Dioxide	13463-67-7		
	Toluene	108-88-3	U109	10
	Xylene	1330-20-7	U239	100
Enamel, Premium Gloss Protective Green #7738830	1,2,4-Trimethylbenzene	95-63-6		
	Acetone	67-64-1	U002	5,000
	Aliphatic Hydrocarbon	64742-89-8		
	Aromatic Hydrocarbon	64742-95-6		
	Aromatic Solvent	64742-95-6		
	Ethylbenzene	100-41-4	None	1,000
	Ethylene Glycol Monobutyl Ether	111-76-2		
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	N-Butyl Acetate	123-86-4	None	5,000
	Pigment Black 7	1333-86-4		
	Pigment Red 122	980-26-7		
	Pigment Violet 32	12225-08-0		
	Propylene Carbonate	108-32-7		
	Stoddard Solvent	8052-41-3		
	Titanium Dioxide	13463-67-7		
	Toluene	108-88-3	U109	10
	Xylene	1330-20-7	U239	100
Enamel, Premium Gloss Protective Red #7763830	1,2,4-Trimethylbenzene	95-63-6		
	Acetone	67-64-1	U002	5,000
	Aliphatic Hydrocarbon	64742-89-8		
	Aromatic Hydrocarbon	64742-95-6		
	Aromatic Solvent	64742-95-6		
	Ethylbenzene	100-41-4	None	1,000
	Ethylene Glycol Monobutyl Ether	111-76-2		
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	N-Butyl Acetate	123-86-4	None	5,000
	Pigment Black 7	1333-86-4		
	Pigment Red 122	980-26-7		
	Pigment Violet 32	12225-08-0		
	Propylene Carbonate	108-32-7		
	Stoddard Solvent	8052-41-3		
	Titanium Dioxide	13463-67-7		
	Toluene	108-88-3	U109	10
	Xylene	1330-20-7	U239	100
Enamel, Premium Orange #789882	MSDS Not Found	None		
Enamel, Super Tough Coat (Black 729-0604)	2-(2-Methoxyethoxy) -ethanol	111-77-3		
	Carbon Black	1333-86-4		
Enamel, Tan	Crystalline Silica	14808-60-7		
	Ethyl Benzene	100-41-4	None	1,000
	Mineral Spirits	64742-48-9		
ES Coolant Blends	MSDS Not Found	None		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Ethylene Glycol Monobutyl Ether	Ethylene Glycol Monobutyl Ether	111-76-2		
FDP-S704-03	MSDS Not Found	None		
FDP-S714-04	MSDS Not Found	None		
FDP-S816-05	MSDS Not Found	None		
FE-1A Acidizing Composition	Acetic Acid	64-19-7	None	5,000
	Acetic Anhydride	108-24-7	None	5,000
Ferchek A Reducing Agent	Citric Acid	77-92-9		
	Hydroxylamine Hydrochloride	5470-11-1		
	Silica, Amorphous-Fumed	7631-86-9		
Ferrotrol 300L (Iron Control)	MSDS Not Found			
Finish, Gloss White V2192833	Acetone	67-64-1	U002	5,000
	Aliphatic Petroleum Distillate	64742-48-9		
	Ethylbenzene	100-41-4	None	1,000
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	Titanium Dioxide	13463-67-7		
	Toluene	108-88-3	U109	10
	Xylene	1330-20-7	U239	100
Finish, Safety Red V2164838	Acetone	67-64-1	U002	5,000
	Ethylbenzene	100-41-4	None	1000
	Ethylene Glycol Monobutyl Ether	111-76-2		
	Liquefied Petroleum Gas	68476-86-8		
	N-Butyl Acetate	123-86-4	None	5,000
	Xylene	1330-20-7	U239	100
Flocelle 3/8"	MSDS Not Found	None		
FMS375 Foamer Stick	MSDS Not Found	None		
FMW3032 Foamer	MSDS Not Found	None		
Foam Soap, Aero green	2-bromo-2-nitropropane-1, 3-diol	52-51-7		
	Citric Acid	77-92-9		
	Cocamidopropyl Betaine	61789-40-4		
	D&C Green No.5	4403-90-1		
	FD&C Yellow No.5	1934-21-0		
	Fragrance	None		
	PPG-24-Glycereth-24	9082-00-2		
	Propylene Glycol	57-55-6		
	Sodium Laureth Sulfate	68585-34-2		
	Tetrasodium EDTA	64-02-8		
	Triclosan	3380-34-5		
	Water	7732-18-5		
FR-26LC	Hydrotreated Light Petroleum Distillate	64742-47-8		
	Hydrotreated Light Petroleum Distillate	64742-47-8		
	9-Octadecenamide, n, n-bis-2(hydroxy-ethyl)-,(Z)	93-83-4		
	Acrylamide Copolymer	None		
	Hydrotreated Light Petroleum Distillate	64742-47-8		
FR-56	Hydrotreated Light Petroleum Distillate	64742-47-8		
Future Floor Finish	Diethylene Glycol Methyl Ether	111-90-0		
	Modified Acrylic Copolymer	None		
	Tributoxy Ethyl Phosphate	000078-51-3		
	Water	7732-18-5		



# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Gasolila WFP (Water Finding Paste)	Triethanolamine	102-71-6		
Gasoline Gauging Paste	All Ingredients Non Hazardous	None		
GBW-30 Breaker	Carbohydrates	None		
	Hemicellulase Enzyme	9012-54-8		
Gel-Sta L Stabilizer	Sodium Thiosulfate	7772-98-7		
Gel-Sta Stabilizer	Sodium Thiosulfate	7772-98-7		
Gilsonite Resin	Natural Asphalt	12002-43-6		
Glade Spin Fresh (Toilet Paper Rollers)	Sodium Silico Aluminate	None		
	Sodium Siulfate	None		
Gone, Carpet Spot Cleaner	Dipropylene Glycol Butyl Ether	29911-28-2		
	Linear Alkyl Benzene Sulfonic Acid	68584-22-5		
	Perfume, Coloring and Additives less than 1%	None		
	Soft Water	7732-18-5		
GP Forward General Purpose Cleaner	Alochol Ethoxylates	68439-46-3		
	Propylene Glycol Methyl Ether	107-98-2		
Grease, #105 Motor Assembly	Calcium Thickener	68309-87-5		
	Mineral Oil	64742-52-5		
	Zinc Oxide	1314-13-2		
Grease, Chevron Ultra Duty EP	Highly Refined Mineral Oil	Mixture		
	Zinc Dialkylidithiophosphate	68649-42-3		
Grease, Super Lube #2	Additives	PROPRIETARY		
	Lubricant Base Oil (Petroleum)	Various		
	Zinc Compounds	PROPRIETARY		
HAI-60 Acid Inhibitor	Potassium Iodide	7681-11-0		
HAI-85M Acid Inhibitor	Copper Iodide	7681-65-4		
	Dimethyl Formamide	68-12-2		
	Ehtyl Octynol	5877-42-9		
	Isopropanol	67-63-0		
	Propargyl Alcohol	107-19-7	P102	1,000
	Quaternary Ammonium Salts	None		
Halad 322 Cement Additive	Cellulose derivative	None		
	Sodium hydroxide	1310-73-2	None	1,000
	Sulfonic Acid Salt	None		
	Modified Acrylic Copolymer	None		
	Sodium Hydroxide	1310-73-2	None	1,000
	Acrylic Resin	Mixture		
	Sodium hydroxide	1310-73-2	None	1,000
	MSDS Not Found			
Halad 9 Cement Additive	MSDS Not Found	None		
Halliburton Super Flush Additive	Crystalline Silica, Quartz	14808-60-7		
	Silica, amorphous-diatomaceous Earth	68855-54-9		
	Sodium Bicarbonate	144-55-8		
	Sodium Metasilicate, Anhydrous	6834-92-0		
Halliburton Weld A Converter	Penetaethylenehexamine	4067-16-7		
	Tetraethylenepentamine	112-57-2		
	Triethanolamine	112-24-3		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Halliburton Weld A Resin	Aluminum	7429-90-5		
	Butyl Glycidyl Ether	None		
	Calcium Carbonate	471-34-1		
	Crystalline Silica, Quartz	14808-60-7		
	Epoxy Resin	None		
Hand Cleaner, Fast Orange 23108	D-Limonene	5989-27-5		
	Ethoxylated C11-C16 Alcohol	127036-24-2		
	Pumice	1332-09-8		
	Silica Quartz	14808-60-7		
	Water	7732-18-5		
HC-2	Inner Salt of Alhyl Amines	None		
	Sodium Chloride	7647-14-5		
Hi-Dense No. 4 Weight Additive	Aluminum Oxide	1344-28-1		
	Crystalline Silica, Quartz	14808-60-7		
	Iron Oxide	1309-37-1		
High Performance Lubricant Syn Film 32	MSDS Not Found	None		
HI-M-PACT 5458 Kinetic Hydrate Inhibitor	MSDS Not Found	None		
	MSDS Not Found			
Howco Gel (Bentonite)	Bentonite	1302-78-9		
	Crystalline Silica, Cristobalite	14464-46-1		
	Crystalline Silica, Quartz	14808-60-7		
	Crystalline Silica, Tridymite	15468-32-3		
Howco Suds Sticks	Polyethylene Glycol	25322-68-3		
	Sodium Chloride	7647-14-5		
Howco-Suds Foaming Agent	MSDS Not Found			
HPT-1	No-Hazardous Substances	None		
HR-12 Additive	Modified Lignosulfonate	None		
HR-5 Additive	Modified Lignosulfonate	None		
HT Breaker	Tert-Butyl Hydroperoxide	75-91-2		
Hydraulic Jack Oil #80054	Distillates (petroleum), Hydrotreated Naphthenic	64742-53-6		
	Polymethacrylate Dispersion	Mixture		
Hydrochloric Acid (HCl)	MSDS Not Found	None		
Hydroclear Super SAE 30 Oil	Additives	PROPRIETARY		
	Lubricant Base Oil (Petroleum)	Various		
	p-dodecylphenol	74499-35-7		
Hydrochloric Acid	Hydrochloric Acid	7647-01-0	None	5,000
HYG-3	Fumaric Acid	110-17-8	None	5,000
HyTemp I (Inhibitor-Intensifier)	MSDS Not Found	None		
Injectrol Component A	Sodium Silicate	1344-09-8		
Injectrol G	Sodium Acid Pyrophosphate	7758-16-9		
	Sodium Silicate	1344-09-8		
Isobutylene	Isobutene	115-11-7		
Isopropyl Alcohol	Isopropanol	67-63-0		
Jump Start Starting Fluid #05761	Carbon Dioxide	124-38-9		
	Diethyl Ether	60-29-7	U117	100
	Heptane	142-82-5		
	Upper Cylinder Lubricant	64741-89-5		
K-34	Sodium Bicarbonate	144-55-8		
K-35	Sodium Carbonate	497-19-8		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
KCL Potassium Chloride	Potassium Chloride	7447-40-7		
KEM Hi-Temp (Heat Resistant Ctg.) 1500 #10, #14	1,2,4-Trimethylbenzene	95-63-6		
	1,3,5-Trimethylbenzene	108-67-8		
	Cumene	98-82-8	U109	10
	Ethylbenzene	100-41-4	None	1000
	Light Aromatic Hydrocarbons	64742-95-6		
	Mineral Spirits	64742-88-7		
	Xylene	1330-20-7	U239	100
Kopr Kote (Anti-Seize Lubricant)	Metallic Copper	744-050-8		
	Nonhazardous Blend	829-805-49		
	Petroleum Oil	64742-65-0		
Kwik Seal Additive	No-Hazardous Substances	Mixture		
Kwik-Seal (Blend nut hulls, wood fiber, cellophane)	MSDS Not Found	None		
Leak detector, SNOOP	Surfactant	Not Available		
	Water	7732-18-5		
Lemon Oil Polish	Aliphatic Petroleum Distillate	64742-06-9		
	Paraffinic Petroleum Distillate	64742-65-0		
LGC-35 CBM	Paraffinic Solvent	None		
	Polysaccharide	None		
LGC-8M	Guar Gum	9000-30-0		
LGC-V	Diesel	68476-34-6		
	Guar Gum Derivative	None		
LGC-VI	Diesel	68476-34-6		
	Guar Gum Derivative	None		
Lime (Calcium Hydroxide)	MSDS Not Found	None		
Liquid Wrench Lubricant #L312	Carbon Dioxide	124-38-9		
	Naphthenic Petroleum Distillate	64742-52-5		
	Tetrachloroethylene	127-18-4	U210	100
Long Life Multi-Purpose Lubricant #1603	MSDS Not Found	None		
Losurf-259 Surfactant	Heavy Aromatic Petroleum Naphtha	64742-94-5		
	Isopropanol	67-63-0		
Losurf-300 Nonionic Surfactant	Ethoxylated Nonylphenol	None		
Lubricant, Power 4-HD-PSP-200 Synthetic Blend	MSDS Not Found	None		
Lubricant, Power 5-TC-30 Synthetic Blend	MSDS Not Found	None		
Lysol Plus Bleach	Alkyl (C12-C16) Dimethyl Benzyl Ammonium Chlorides	68424-66-1		
	Alkyl (C12-C18) Dimethyl Benzyl Ammonium Chloride	68391-01-5		
Marvel Mystery Oil	Chlorinated Hydrocarbons	00095-50-1	U109	10
	Mineral Spirits	08052-41-3		
	Naphthenic Hydrocarbons	64742-52-5		
Matrixflo II	Dimethyl Glutarate	1119-40-0		
MC PDX-4500 Foaming Agent	MSDS Not Found	None		
Methanol	Methanol	67-56-1	U154	5,000
	MSDS Not Found			
MF-1	Sodium Acid Pyrophosphate	7758-16-9		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
MI Gel (Sodium Montmorillonite)	MSDS Not Found	None		
Microbond Expanding Additive	Calcium Hydroxide	1305-62-0		
Microbond HT Cement	Magnesium Oxide	1309-48-4		
MO-67	Sodium hydroxide	1310-73-2	None	1000
Modified Gauging Paste-Methanol	Methanol	67-56-1	U154	5,000
Modified Water Finding Paste M-3	All Ingredients Non Hazardous	None		
Morflo III Surfactant	1-Methoxy-2-Propanol Dodecylbenzene Sulfonic Acid	107-98-2 27176-87-0	None	1,000
Murphy's Oil Soap	None	None		
Musol A Solvent	Oxylated Alcohol	None		
Natural Gas	Ethane Methane Propane MSDS Not Found	74-84-0 74-82-8 74-98-6		
NE-118 (Non-Emulsifying Agent)	MSDS Not Found	None		
Nitrogen Liquefied	Nitrogen	7727-37-9		
Nitrogen, Gas	Nitrogen	7727-37-9		
No 327 Armor Plate w/Moly-D	MSDS Not Found			
No. 1 Thinner	Mineral Spirits as Stoddard Solvent	8052-41-3		
Non-Flammable 19% O2, 25% LEL Pentane, H2S, N2	Carbon Monoxide Hydrogen Sulfide Methane Nitrogen Oxygen	630-08-0 7783-06-4 74-82-8 7727-37-9 7782-44-7	U135	100
Optiflo-HTE	Crystalline Silica, Quartz Walnut Hulls	14808-60-7 Mixture		
Optiflo-II Delayed Release Breaker	Ammonium Persulfate Crystalline Silica, Quartz	7727-54-0 14808-60-7		
Optiflo-III Delayed Release Breaker	Ammonium Persulfate Crystalline Silica, Quartz	7727-54-0 14808-60-7		
Optiflo-LT Delayed Release Breaker	Citric Acid Polyvinylidene Chloride	77-92-9 9002-85-1		
Orange Hand Cleaner, LC 25108	Castor Oil D-Limonene Ethoxylated C11-C16 Alcohol Propylene Glycol Pumice Silica Quartz Water	8001-79-4 5989-27-5 127036-24-2 57-55-6 1332-09-8 14808-60-7 7732-18-5		
Pacemaker T-68	Distillates, Petroleum, Hydrotreated heavy paraffinic Distillates, Petroleum, Solvent-refined heavy paraffinic Proprietary Ingredients	64742-54-7 64741-88-4 Mixture		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Paint & Varnish Remover, Kwik All Purpose	Ethylene Glycol Monobutyl	111-76-2		
	Isopropanol	67-63-0		
	Methanol	67-56-1	U154	5,000
	Methylene Chloride	75-09-2	U080	1,000
	Water	7732-18-5		
Paint Marking Orange V2344834, V2345828	Aromatic Hydrocarbon	64742-95-6		
	Hydrotreated Light Distillate	64742-47-8		
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	Naphtha	8032-32-4		
	Polymer Anchored Green Dye Dispersion	Mixture		
	Toluene	108-88-3	U109	10
	Xylene	1330-20-7	U239	100
Paint, Interior-Exterior 1504	1-Butanol	71-36-3	U031	5,000
	1-Methoxy-2-Propanol Acetate	108-65-6		
	Acetone	67-64-1	U002	5,000
	Butane	106-97-8		
	Ethylbenzene	100-41-4	None	1,000
	Methyl Ethyl Ketone	78-93-3	U159	5,000
	Methyl Isobutyl Ketone	108-10-1	U161	5,000
	Propane	74-98-6		
	Titanium Dioxide	13463-67-7		
	Xylene	1330-20-7	U239	100
Paint, Interior-Exterior Black 1601	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Interior-Exterior Blue 3546	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Interior-Exterior Clear 1301	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Interior-Exterior Green 2001	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Interior-Exterior White 1501	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Interior-Exterior Yellow 1806	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Inverted Orange Marking Paint RDMI 1000	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Semi-Gloss House & Trim White 9500	Ethylene Glycol	107-21-1	None	5,000
	Proprietary Additive	None		
	Proprietary Pigment	None		
Paint, Spray Green 2324	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Spray OSHA Orange 2410	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Paint, Spray OSHA Yellow 1813	See Sherwin Williams (krylon) Paint, Interior-Exterior 1504	None		
Para-Dichlorobenzene Urinal blockers	p-Dichlorobenzene (a,b,c,d,e,f)	106-46-7	U109	10
Parts Cleaning Fluid, Agitene	Aliphatic Petroleum Distillate	64742-88-7		
	DPM (Dipropylene Glycol Methyl Ether)	34590-94-8		
PEN-88	Oxylated Alcohol	None		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Pine Sol	Alkyl alcohol ethoxylates	127036-24-2		
	Isopropyl alcohol	67-63-0		
	Pine oil	8002-09-3		
	Sodium petroleum sulfonate	68608-26-4		
Pledge, Lemon Scent	Butane	106-97-8		
	Isobutane	75-28-5		
	Isoparaffinic Hydrocarbon Solvent	64741-66-8		
	Propane	74-98-6		
	Silicones	63148-62-9		
	Water	7732-18-5		
Porter Guard Fast Dry Enamel	(As Nuisance Particulates)	37244-96-5		
	(As Silica, Crystalline and Quartz)	14808-60-7		
	(As Talc containing non-asbestos fibers)	12135-86-3		
	(As Talc containing non-asbestos fibers)	14567-73-8		
	(As Zinc Compounds)	1314-13-2		
	Antigorite	12135-86-3		
	Aromatic Naphtha	64742-95-6		
	Mica	12001-26-2		
	Naphtha	8052-41-3		
	Quartz	14808-60-7		
	Sodium Potassium Aluminum Silicate	37244-96-5		
	Talc	14807-96-6		
	Termolite	None		
	Xylenes	1330-20-7	U239	100
	Zinc Oxide	1314-13-2		
Pozmix A	Crystalline Silica, Cristobalite	14464-46-1		
	Fly Ash	68131-74-8		
Primer #30753	Acetone	67-64-1	U002	5,000
	Cyclohexanone	108-94-1	U057	5,000
	Methyl Ethyl Ketone	78-93-3	U159	5,000
	Tetrahydrofuran	109-99-9	U124	100
Primer, Red V2169838	Acetone	67-64-1	U002	5,000
	Basic Zinc Molybdate	61583-60-6		
	Ethylbenzene	100-41-4	None	1,000
	Liquefied Petroleum Gas	68476-86-8		
	Magnesium Silicate	14807-96-6		
	N-Butyl Acetate	123-86-4	None	5,000
	Stoddard Solvent	8052-41-3		
	Titanium Dioxide	13463-67-7		
	Xylene	1330-20-7	U239	100
	Zinc Phosphate	7779-90-0		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Primer, Sandable Gray 1318	2-Methyl-1-Propanol	78-83-1	U140	5,000
	Acetone	67-64-1	U002	5,000
	Butane	106-97-8		
	Calcium Carbonate	471-34-1		
	Propane	74-98-6		
	Talc	14807-96-6		
	Titanium Dioxide	13463-67-7		
	Toluene	108-8-3	U109	10
	V. M. & P. Naphtha	64742-89-8		
Primer/Sealer White 8520 Primer/Sealer, Interior Latex (White 728-9416)	Ethylbenzene	100-41-4	None	1,000
	Mineral Spirits	64742-88-7		
	Mineral Spirits 140-Flash	64742-88-7		
	Talc	14807-96-6		
	Titanium Dioxide	13463-67-7		
	Xylene	1330-20-7	U239	100
	Cristobalite	14464-46-1		
	Ethylene Glycol	107-21-1	None	5,000
	Kaolin	1332-58-7		
	Quartz	14808-60-7		
	Titanium Dioxide	13463-67-7		
Produced Water	Produced water	None		
Propane	Propane	74-98-6		
PVC Cement 1200	Acrylic Resin	96-33-3		
	Amorphous fumed Silica (non-hazardous)	112945-52-5		
	Cyclohexanone	108-94-1	U057	5,000
	Methyl Ethyl Ketone	78-93-3	U159	5,000
	PVC Resin (Non-Hazardous)	9002-86-2		
	Tetrahydrofuran	109-99-9	U124	100
PVC Solvent Cement	Acetone	67-64-1	U002	5,000
	Cyclohexanone	108-94-1	U057	5,000
	Methyl Ethyl Ketone	78-93-3	U159	5,000
	PVC Resin (Non-Hazardous)	9002-86-2		
	Tetrahydrofuran	109-99-9	U124	100
QD Contact Cleaner #02130	1,1-Difluoroethane (HFC-152a)	75-37-6		
	Hexane Isomers	Various		
	Methanol	67-56-1	U154	5,000
	n-Hexane	110-54-3		
	Synthetic Isoparaffinic Hydrocarbon	64741-66-8		
Raid	2-Phenethyl Propionate	None		
	Eugenol	None		
	Isoparaffinic Hydrocarbon Solvent	None		
	Propellant	None		
	Solvents	None		
Resolve	Isopropyl alcohol	67-63-0		
	Propylene Glycol Monomethyl Ether	107-98-2		
Reverse Demulsifier RBW0118D	MSDS Not Found	None		
Ro-Rep	MSDS Not Found	None		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Round-Up Weed Killer	Biocide	38641-94-0		
	Glyphosate Isopropylamine salt			
	Stabilizer			
	Surfactant			
	Water	7732-18-5		
Rush Safety Solvent	MSDS Not Found	None		
S-400 (Surfactant)	MSDS Not Found	None		
SAE 5AW-30 Motor Oil	Additives	PROPRIETARY		
	Lubricant Base Oil (Petroleum)	Various		
Salt, Oilfield Fine	Sodium Chloride	7647-14-5		
Salt, Ottawa	MSDS Not Found	None		
Sand- 40/60 Wedron Special Frac	Crystalline Silica, Quartz	14808-60-7		
Sand- Oklahoma No. 1- SSA-2	Crystalline Silica, Quartz	14808-60-7		
SandWedge NT	Heavy Aromatic Petroleum Naphtha	64742-94-5		
SCA-130 Inhibitor	Acetaidehyde	75-07-0	U053	100
	Aldol	107-89-1		
	Crotonaidehyde	123-73-9		
Scotchrap Brand Pipe Primer	Benzene	71-43-2	U109	10
	Butyl rubber	9010-85-9		
	Calcium Zinc Resinate	68334-35-0		
	Carbon Black	1333-86-4		
	Ethyl Alcohol	64-17-5		
	Kaolinite	1318-74-7		
	Mica-Group Minerals	12001-26-2		
	Peperylene-2-Methyl-2-Butene Polymer	26813-14-9		
	Quartz Silica	14808-60-7		
	Solvent Naphtha (Petroleum), Light Aliphatic	64742-89-8		
	Toluene	108-88-3		
Scrubs, Rough Touch	Cocoamide DEA	68603-42-9		
	Ethoxylated Alcohols (C12-15 Pareth-7)	68131-39-5		
	Isoparaffinic Hydrocarbon	64742-47-8		
	Mineral Oil (mist)	8042-47-5		
	Oleic Acid	61790-12-3		
	Propylene Glycol	57-55-6		
	Pumice (dust)	1332-09-8		
	Triethanolamine	102-71-6		
	Water	7732-18-5		
Sealant, #5 Pipe Thread #25431	Diacetone Alcohol	123-42-2		
Sealant, #5 Pipe Thread Special #26431	Diethylene Glycol Methyl Ether	111-90-0		
Sealant, 736 RTV	Ethyltriacetoxysilane	17689-77-9		
	Methyltriacetoxysilane	4253-34-3		
SGA-1 Gelling Agent	Acetic Acid	64-19-7	None	5,000
SGA-HT Gelling Agent	Branched Ethoxylated Nonylphenol	68412-54-4		
	Hydrotreated Heavy Naphthenic Distillate	64742-52-5		
SI-16 WSP	MSDS Not Found	None		
Silica Flour-SSA-1	Crystalline Silica, Quartz	14808-60-7		
Silicalite- Compacted	Silica, Amporphous-Fumed	7631-86-9		



# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Silicone Ad Sealant, Red High Temp RTV	Acetic Acid	64-19-7	None	5,000
	Dimethyl polysiloxane	63148-62-9		
	Distillates (petroleum), hydrotreated middle	64742-46-7		
	Ethyltriacetoxysilane	17689-77-9		
	Methyltriacetoxysilane	4253-34-3		
	Poly(dimethylsiloxane), hydroxy terminated	70131-67-8		
	Silica, amorphous (fumed)	7631-86-9		
Silicone Sealant, RD Pro RTV	Dimethylsiloxane, hydroxy-terminated	70131-67-8		
	Ethyltriacetoxysilane	17689-77-9		
	Iron (III) Oxide	1309-37-1		
	Methyltriacetoxysilane	4253-34-3		
	Non-hazardous ingredients	None		
	Polydimethylsiloxane	63148-62-9		
	Silica (as amorphous silica, total dust)	7631-86-9		
Silicone, High T RTV #81409	Titanium Dioxide	13463-67-7	None	5,000
	Acetic Acid	64-19-7		
	Amorphous Silica	7631-86-9		
	Distillates (petroleum), Hydrotreated Middle	64742-46-7		
	Ethyltriacetoxysilane	17689-77-9		
	Iron Oxide	1309-37-1		
	Methyltriacetoxysilane	4253-34-3		
	Poly (Dimethylsiloxane), Hydroxy Terminated	70131-67-8		
	Polydimethylsiloxane	63148-62-9		
	Titanium Dioxide	13463-67-7		
Skid Tex for Paint	Pumice	1332-09-8		
	Quartz	14808-60-7		
Slick Willie- OF WSP	MSDS Not Found	None		
Snapback Spraybuff Liquid	Diethylene Glycol monoethyl Ether	111-90-0		
Snow & Ice Melt	Calcium Chloride	010043-52-4		
	Potassium Chloride	07447-40-7		
	Sodium Chloride	7647-14-5		
Soda Ash (Sodium Carbonate)	MSDS Not Found	None		
Sodium Bicarbonate	MSDS Not Found	None		
Sodium Persulfate	Sodium Persulfate	7775-27-1		
Solidifier, Belzona 1221Super-e Metal	MSDS Not Found	None		
Solidifier, Belzona 1321 Ceramic S-Metal (Blue/Gray)	MSDS Not Found	None		
Soltex (Sodium Asphalt Sulfonate)	MSDS Not Found	None		
SP Breaker	Sodium Persulfate	7775-27-1		
SP-101 (Sodium Polyacrylate)	MSDS Not Found	None		
Spartan Pine Cleaner	Pine Oil	8002-09-3		
	Potassium Cocoate	61789-30-8		
	Sodium Xylene Sulfonate	1300-72-7		
SSO-21	Diethylene Glycol	111-46-6		

# APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
SSO-21M Winterized	Ethoxylated Nonylphenol	None	U154	5,000
	Ethylene Glycol Monobutyl Ether	111-76-2		
	Methanol	67-56-1		
Stannic Chloride	Tin Chloride	7646-78-8		
Starting Fluid, SFR-11	Carbon Dioxide	124-38-9	U117	100
	Ethyl Ether	60-29-7		
	n-Heptane	142-82-5		
Stihl 2 Cycle Universal Engine Oil #07813198903	Additive Package	Mixture		
	Dye	Mixture		
	Petroleum Distillates, Hydrotreated Heavy Paraffinic	64742-54-7		
	Petroleum Distillates, Solvent Dewaxed Heavy Paraffinic	64742-65-0		
	Residual Oils (petroleum), Hydrotreated	64742-57-0		
	Residual Oils (petroleum), Solvent Dewaxed	64742-62-7		
	Stoddard Solvent	8052-41-3		
Strawberry Fragrance Master	MSDS Not Found	None		
Stride Floral	MSDS Not Found	None		
Sugar Cane Sucrose	Carbohydrates	None		
Super CBL Additive	Aluminum	7429-90-5		
Super HS Bauxite (20-40 Mesh)	Aluminum Oxide	1344-28-1		
	Aluminum Silicate	1302-76-7		
	Phenol/Formaldehyde resin	9003-35-4		
Super Prop Propant	Phenol/Formaldehyde resin	9003-35-4		
Terminator	Alkyloxypolyethyleneoxyethanol	84133-50-6		
	Blend of n-Alkyl Dimethyl Benzyl and Di-n-alkyl Dimethyl Ammonium Chlorides	68424-85-1		
		68424-94-3		
	Perfume, Coloring and Additives less than 1%	None		
	Soft Water	7732-18-5		
	Tetrasodium Ethylenediammine Teraacetate	64-02-8		
TFE Seal/ Valve Lubricant	MSDS Not Found	None		
Thinner #641	MSDS Not Found	None		
Time Mist Air Freshener	Acetone	67-64-1	U002	5,000
	C8-C9 Isoparaffinic Hydrocarbons	64742-48-9		
	Diethylene Glycol Methyl Ether	111-90-0		
	Perfume Oils-Supplier Trade Secret	None		
	Propane	74-98-6		
TLC-80	Aluminum Oxide	1344-28-1		
TLC-W3-Rock Salt	Crystalline Silica, Cristobalite	14464-46-1		
Toluene	Toluene	108-88-3	U109	10
Triethylene Glycol	MSDS Not Found	None		
Universal Solvent Blend	Acetone	67-64-1	U002	5,000
	Ester EEP	763-69-9		
	n-Butane	106-97-8		
	Propane	74-98-6		
Unleaded Gasoline	Benzene	71-43-2	U109	10
	Gasoline	None		
US-40 (Solvent)	MSDS Not Found	None		

## APPENDIX K—HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Product	Hazardous Substances	CAS#	RCRA#	RQ* (lbs)
Valuprop Ceramic Propant	Aluminum Silicate	1302-76-7		
Valve Flush	None	None		
Vanish Drop Ins	Acid Blue #9	3844-45-9	None	1,000
	Hydroxyethyl Cellulose	9004-62-0		
	Pine Oil	8002-09-3		
	Sodium Dodecylbenzene sulfonate	25155-30-0		
	Sodium Gluconate	527-07-1		
	Sodium Sulfate	7757-82-6		
	Sodium Tetraborate Pentahydrate	1330-43-4		
Versaprop (all mesh sizes)	Aluminum Oxide	None		
	Aluminum Silicate	None		
Versaset	Sodium Aluminate	1302-42-7		
Vicon NF Breaker	Chlorous Acid, Sodium Salt	7758-19-2		
	Sodium Chloride	7647-14-5		
Water Finding Paste	All Ingredients Non Hazardous	None		
WD 40 Aerosol	Aliphatic Petroleum Distillate	8052-41-3		
	Carbon Dioxide	124-38-9		
	LVP Hydrocarbon Fluid	64742-47-8		
	Non-hazardous ingredients	None		
	Petroleum Based Oil	64742-65-0		
WG-17 Gelling Agent	Cellulose derivative	None		
WG-31 Gelling Agent	Guar Gum	9000-30-0		
Windex, Blue	Ethylene Glycol n-hexyl ether	112-25-4		
	Isopropanol	67-63-0		
	Water	7732-18-5		
WLC-5 Fluid Loss Additive	Complex Carbohydrates	None		
Xylene	Ethyl Benzene	100-41-4	None	1,000
	Xylene	1330-20-7	U239	100
ZoneSealant 2000	Isopropanol	67-63-0		
ZoneSealant 3000	Keratins, Hydrolyzates	69430-36-0		

\* Reportable Quantity